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STUDIES

OF

NATURE.

TRANSLATED

FROM THE FRENCH

OF

James-Henry-Bernardin De Saint Pierre. K

IN THREE VOLUMES.

.... Miseris succurrere disco.

Æsop, Lib. 1.

VOL. I.

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PREFACE

TO

THE SECOND EDITION.

THE first edition of this work, published in December 1784, was, in the month of December following, nearly out of print. As this rapid demand took place without my using any of the arts employed by booksellers to promote the sale, or make the work known in remote parts, I am induced to think, that it was favorably received in France. It appears also not to have been disliked in foreign countries; for spurious editions of it were published at Geneva and Lyons, six months ago; and the sale of these editions might have done me the greatest injury, had not M. Laurent De Villedeuil, then director-general of the press, now intendant at Rouen, and so well known by the politeness and probity of his character, given, on my bare requisition, the strictest orders to prevent their being introduced into

the kingdom.* Beside, on account of this work, count De Vergennes, baron De Breteuil, and M. De Calonne, my ancient and illustrious subscribers, on the solicitation of my respectable friends, Messieurs Hennin and Mesnard, conferred upon me or my family some of those annual benefactions granted by the king. I ought, no doubt, to be satisfied with this success; and I am no less so with the honourable testimonies of friendship given me by persons of both sexes, and of every condition, the greater part of whom are unknown to me. Some have paid me visits, and others have written the most affecting letters, to thank me for my book, as if, by publishing it, I had done them a particular service. Several of them have invited me to their seats, that I may be in the midst of those rural scenes, among which, they tell me, I should find it so agreeable to live. Yes, without doubt, I should find pleasure in a country residence, but it must be in one of my own, and not in that of another. I returned the best answer I could to such flattering offers of service, of which I accepted only the good will. Good will is the flower of friendship; and its perfume is sure to continue as long as it is left on its stalk without being

* I am informed, that, for four months past, they have been introduced at Nismes, Marseilles, and Toulon, and this is the case, no doubt, elsewhere; so that the booksellers in these cities, during the above period, have not called for any copies of the genuine edition, by which the sale has been considerably lessened. A conduct so contrary to the literary property of authors and their privileges, as well as to the king's orders, ought certainly to be repressed. I expect this justice from the equity of the magistrate who presides over this department.



gathered. An unfortunate father of a family sent me word, that my Studies afforded him the sweetest consolation. An atheist came several times to see me, from a city at a considerable distance from Paris, struck with admiration, as he said, of the harmonies I had pointed out in plants, and of which he recognised the existence in nature. Some persons of consequence, and others who believe themselves to be so, have endeavoured to allure me to them, by holding out to me the gilded prospect of making my fortune; but as long as I value the rare felicity of being loved, and, what I prize still more highly, of being useful, so long shall I avoid, if I can, that misfortune, so common and so humiliating, of depending on others for protection. I do not say this from vanity, but to acknowledge, as far as lies in my power, as I have ever done, even the slightest marks of friendship, when I believe them to be sincere.

From these concurring suffrages of respectable persons of different kinds, I have reason to think, that God has blessed my labour, though full of imperfections. As it is my duty to render it as worthy as I can of public esteem, I have corrected, in this edition, the typographical errors, inaccuracies of style, obscurities, and want of taste, which I remarked in the former, either myself or by the assistance of well informed persons, without, however, retrenching any thing from the essence of the matter, in conformity to their wishes. I have only taken the liberty, for the sake of more elucidation, to make some transpositions in the notes, to add a few new ones, with the same intention, and to give, in the Explanation of the Plates, a geometrical figure, in order

to render perceptible to the eye the error of our astronomers respecting the flatness of the earth at the poles, and to furnish new proofs of the alternate and semi-annual course of the Atlantic Ocean by the melting of the polar ice. Lastly, I have had it printed with a new type, by Didot, junior, that it may be rendered more worthy of general approbation.

I could have wished to have derived information respecting the subject of my book from the enlightened criticisms of the public journals. Their authors, in that respect, have been left at full liberty; for I never solicited, nor caused to be solicited, the favor of any of them; but they have confined themselves to observations of very little importance. That journal, which comprehends the most objects, and which, from the great talents of its editors, seems best calculated to have given me information, finds fault with me, for saying that animals are not naturally exposed to perish by famine, like man; and has remarked, in opposition to what I have asserted, that partridges and hares, in the neighbourhood of Paris, die sometimes of hunger during the winter. But since, on the one hand, we multiply almost to infinity, the breed of these animals in the neighbourhood of Paris, and that, on the other, even the short grass of the meadows is mowed, they must necessarily die sometimes of hunger, especially when the winters are long. The famine, then, which they experience in our fields arises from the absurdity of man, and not from the improvidence of nature. Partridges and hares do not perish through want in the forests of the north, during winters of six months continuance.

They have sufficient instinct to find, under the snow, the grafs and fir cones of the preceding year, which nature has concealed there, in order to preserve their lives.

The other objections which the journalists have made, are neither of more importance nor better founded. The greater part of them consider as a paradox the cause of currents and of the ebbing and flowing of the sea, which I ascribe to the alternate melting of the ice at the poles, which, in the winter of each hemisphere, is five or six thousand miles in circumference, and in their summer only three thousand. But as none of them have adduced a single argument, either against the principles of my theory, the facts by which I support it, or the consequences I thence deduce, I have nothing to say in reply, except that they have condemned without examination; which is a mode, no doubt, expeditious, but at the same time equally unjust. The editor who has most subscribers, and who certainly merits them by the good taste which he shews in his daily criticisms of literary productions, has objected to me, cursorily, that I destroy the action of the moon, which agrees so well with the theory of the tides. It is, however, easy to perceive, that he is not well acquainted either with my new system or with the old one: for I by no means destroy the action of the moon on the seas; I only, instead of making it act on the fluid seas of the equator, by an astronomical attraction, which does not produce the least effect on mediterranean seas, and even on the lakes of the torrid zone, instead of this, I make it act on the frozen seas of the poles, by the

reflected heat of the sun, admitted by the ancients,* demonstrated at present by the moderns, and which every individual may himself ascertain by a glass of water. Beside, the phases of the moon must accord with the movement of the sea throughout the whole globe. The flux and reflux of the sea, on our coasts, follow rather the mean than the real movement of the moon: in other places they obey other laws, which made Newton himself say, "That in the periodi-

* "The moon occasions thaws, dissolving ice and frost by the "humidity of her influence." *Pliny's Nat. Hist. Book II. chap. ci.* When the moon shines, during the winter nights, with her full splendor, it freezes, no doubt, very intensely: because the north wind, which then renders the air serene, prevents the warm influence of the moon; but if it be the least calm, you will see the heavens covered with vapours exhaled from the earth, and you will perceive the atmosphere milder. I ascribe, as Pliny does, to the light of this planet a particular action on the congealed water of the earth and atmosphere, for I have frequently seen, in the fine nights of the torrid zone, all the clouds of the atmosphere disperse in an ascending direction, which gave rise to the proverb, common among sailors, that the *moon is eating up the clouds*. In a word, our philosophers contradict themselves, by supposing that the moon moves the ocean, and by denying that it has any influence either on the ice or the planets, because its heat, say they, does not make the liquor rise in the thermometer. I am ignorant, indeed, whether it may not have some action upon spirit of wine: but from this, what conclusion is to be drawn? Do the igneous particles, contained in pepper, cloves, pimento, caustics, &c. which have so much action on the fluids of the human body, cause spirit of wine, in which they have been infused, to shew the smallest degree of ascension? Fire, as well as other elements, is subject to combinations which redouble its action in certain affinities, and destroy it in others. It is not then, with our philosophical machines that we shall be able to determine the effects of natural causes.

cal return of the tides, there must be some other combined cause hitherto unknown."* The explanation of these phenomena, which cannot be reconciled with the astronomical system, agrees perfectly with my natural theory, which ascribes to the alternate heat of the sun, both direct and reflected from the moon, the cause, variation, and constant return of the tides, and, above all, of the general and alternate currents of the ocean, which are the immediate moving principles of these tides. Our astronomers, notwithstanding, have never attempted to assign a cause for the semi-annual versatility of these general currents, so well known in the Indian Ocean; and they seem even to have been hitherto ignorant that others of a similar kind exist in the Atlantic. This, however, can no longer be doubted, after the new proofs which I have adduced in the present edition.

Respecting causes, then, so evident, I have not advanced a single paradox; but I have opposed to an astronomical system, destitute of physical proofs, well established facts, drawn from all the kingdoms of nature,—facts which have a multitude of consonances with the flux and reflux of all rivers and lakes, that flow from the glacial mountains, and which I could increase, and present under new lights, in regard to the ocean itself, if I had a proper opportunity, and my health would permit.

One journal, which, from its title, would appear destined for the perusal of all Europe; and another, which seems reserved merely for the learned, have thought proper to observe the most profound silence, not only

* Newton's Philosophy, ch. xxv.

on natural truths, so new and so important, but even on my whole work. Others have made no other reply than to oppose to me the authority of Newton, who is not of my opinion. I respect Newton for his genius and his virtues, but I respect truth more. The authority of great names serves too often as a rampart to error; and it is thus, on the authority of Maupertius and Condamine, that Europe has hitherto believed that the earth is flattened at the poles. I have demonstrated, from their own operations, in the Explanation of the Plates,* that it is there elongated. What reply can be made to the geometrical demonstration I have given? For my part, I am fully persuaded, that Newton himself, were he still alive, would abandon that error, though, since the truth must be told, he was the first who gave rise to it.

The reader will, no doubt, be surprized to see men of such celebrity fall into so strange a contradiction;—a contradiction adopted afterwards on their assertion, and taught in all the academies of Europe, without any one observing it, or daring, if he did observe it, to remonstrate in favour of the truth. I have been so astonished at it myself, that I long thought it was I, and not they, who had lost all power of examining evidence on this point. I even durst not venture to open my mind to any person on this or on the other objects of these Studies; for the men I have met with in the world, have been almost all devoted to systems which have become popular, or else to those which were in the high road to it. Thus the more I was in the right, standing alone and without partizans to support my

* Placed at the end of the work.

opinions, the more I should have been in the wrong with such men. Beside, how is it possible to reason with persons who involve themselves in clouds of equations or metaphysical distinctions, when ever so little pressed by the force of truth? If these subterfuges fail them, they overpower you with innumerable authorities, by which they themselves have been subjugated, without reasoning; and with which they mean to subjugate, in their turn, the man, especially, who does not adhere to any party. What should I have done in this crowd of vain and intolerant beings, who are told from infancy, by their European education, *Be the first*; and among so many titled and untitled doctors, who have assumed to themselves the sole right of speaking with freedom, except it were to shut myself up, as I often do, within my sanctuary of silence? If I speak before men of this description, it is on few subjects, and those of little importance.*

* In such society, a man is not long permitted to remain in possession of this right of silence; for those who speak there do not wish to be heard but by those who applaud them.

I have observed, that the degree of attention which the world pays to its orators, is always proportioned to the degree of power or malignity it supposes them to possess. Truth, reason, wit itself, often are of no avail. To be listened to, it is necessary to be feared. Those who shine in such circles frequently employ expressions which convey an idea that they can be either powerful friends or dangerous enemies. Every plain, modest, upright, worthy man is there reduced to silence; a silence from which he can only free himself by flattering his tyrants; but this method would produce on me a contrary effect; for I can flatter only those whom I love.

Fly, then, from the world, ye who wish neither to flatter nor to slander; for you will lose both the good things which you hope for, and those which are the gift of your conscience.

In the free and solitary paths, however, in which I searched for truth, I guided my steps by the new rays of her light, recollecting that the most celebrated philosophers had in all ages been as much blinded by their own errors, as the illiterate are by the errors of others. Beside, to demonstrate the absurdity of our modern astronomers, nothing was necessary but to employ some of the elements of geometry, which are level to my capacity, and to that of all mankind. Being thus assured, by a multitude of meteorological, nautical, vegetable, and animal observations, that the water of the polar ice had a natural tendency towards the equator, and vexed at being contradicted by the operations of our geometricians, which are more celebrated than they deserve to be, I ventured to examine their results, and became convinced, that they ought to be the same as my own. In a former edition, I presented both to the public: their's remained without a defence, and mine were not objected to, though they found no open partizans. In the second edition, I have demonstrated their error, by geometrical evidence; and I now leave my cause with the conscience of every candid reader.

Our astronomers have been misled by the prejudices of education—prejudices, which from infancy attach us, without reflexion, to accredited errors, that lead to fortune, and make us reject those salutary truths which tend a contrary way. They have been misled by the reputation of Newton, an objection which is made to myself, and Newton was misled, as is generally the case, by his own system. This sublime philosopher supposed, that the centrifugal force, which he applied

to the movement of the stars, had flattened the poles of the earth, by acting on the equator. Norwood, an English mathematician, having found, by measuring the meridian from London to York, the terrestrial degree to be eight fathoms greater than that measured by Cassini, in France,—“Newton,” says Voltaire, “ascribed “this small excess, of eight fathoms in every degree, to “the figure of the earth, which he thought to be that “of a spheroid flattened at the poles, and he judged “that Norwood, by taking his meridian in a country “lying more to the north than ours, must have found “his degrees greater than those of Cassini, since he “supposed the curve of the ground measured by “Norwood to be longer.” It is evident, that the degrees being greater, and the course longer towards the north, Newton ought to have concluded, that the earth is elongated at the poles; and the reason of his inferring that it is flattened, was, because all the faculties of his vast genius being occupied by his celestial system, did not permit him to observe a geometrical absurdity in this supposition: he adopted, therefore, without examination, an experiment which he thought favourable to his ideas, not perceiving that it was diametrically opposite to them. Our astronomers, in their turn, have suffered themselves to be misled by the reputation of Newton; and by that weakness so common to the human mind, of endeavouring to explain all the operations of nature by a single law. Bouquier, even, one of their co-operators, says expressly, in his *Treatise on Navigation*,* that upon this flatness at the poles almost all physics depend.

* Book V. chap. v. sect. ii. p. 435.

Our astronomers, then, have set out on an excursion to the extremities of the earth, to seek for physical proofs of a happy and brilliant celestial system, and they were so much dazzled by it beforehand, that they did not recognise even the truth itself, which, at a distance from the prejudices of Europe, came to seek shelter under their wings in the deserts. If the most celebrated of modern geometricians could fall into so great an error, and if astronomers, possessed, in other respects, of the utmost sagacity, have, by the influence of his name alone, deduced a false consequence from their own operations to support this error—rejected the preceding experiments of their own academy respecting the falling of the barometer in the north, with other geographical observations that contradict it—established on it the basis of all future physical knowledge—and afterwards given it, by their own reputation, an authority that has not left to the rest of the learned the liberty of doubting,—it behoves us poor, ignorant, and obscure men, who pursue truth merely for the pleasure of being acquainted with it, to be greatly on our guard. In our search for it, then, let us mistrust every human authority, as Descartes did, who, by doubting alone, banished the philosophy of his age, which had so long veiled from Europe the laws of nature by the prejudice of the name of Aristotle, consecrated, at that time, in all universities; and let us adopt, as a maxim, that which enabled Newton himself to make so many real discoveries, as well as the Royal Society of London, whose motto is : NULLIUS IN VERBA.

But to return to our journals; if they have, as it were, in concert, refused their approbation to the natural

objects of these Studies, one of them has advanced, I am told, that I had borrowed my theory of the tides by means of the polar ice, from certain Latin authors. This theory is, at last, it seems, gaining proselytes, since it is thus exciting envy.

My answer to this imputation is as follows :—Had I been acquainted with any Latin author who ascribes the tides to the melting of the polar ice, I should certainly have mentioned him, as an act of justice which the nature of my work and every principle of conscience demanded of me. I have not, like so many philosophers, had the vanity to create, at my leisure, a world according to my own fancy; but have endeavoured, with much labour, to collect fragments of the plan of that which we inhabit, dispersed in writers of all ages and all nations, who have been the most attentive observers of it. Accordingly, I have drawn my ideas of the elongation of the earth at the poles from Childrey, Kepler, Tycho Brahae, Cassini,—and, above all, from the operations of our modern astronomers; of the extent of the frozen oceans which cover the poles, from Dennis, Barents, Cook, and all the navigators of the north and south seas; of the ancient deviation of the sun from the ecliptic, from the traditions of the Egyptians, the Chinese annals, and even from the mythology of the Greeks; of the total melting of the polar ice, and the general deluge which followed, from Moses and Job; of the heat of the moon and its effects on the ice and waters, from Pliny, and modern experiments made at Rome and at Paris; of the currents

and tides which flow alternately from the poles towards the equator, from Christopher Columbus, Barents, Martens, Ellis, Linschotten, Abel Tasman, Dampier, Pennant, Rennefort, &c. ; and I have quoted all these observers in terms of approbation. Had I known of any Latin author, who ascribes to the melting of the polar ice the cause of the tides, even in any part of the ocean, I should have quoted him in like manner, reserving to myself the glory of being the architect ; of collecting all these scattered observations ; of assigning them to the proper seasons and latitudes, in order to remove the apparent contradictions which have hitherto prevented any conclusions to be deduced from them ; and, in the last place, of assigning a cause, and evident means to effects, which, during so many centuries, have been involved in mystery. I have formed one whole of all these scattered facts, and have deduced from them the general harmony of the movements of the ocean, the first *cause* of which is the heat of the sun ; while the *means* are the polar ices, and the *effects*, the semi-annual and alternate currents of the seas, with the diurnal tides on our coasts.* If others have asserted, before me, that the tides are produced by the melting of the polar ice, a circumstance which I am yet ignorant of, I am at least the first

* Many readers will find it difficult to conceive how our tides can in summer rise towards the north pole, at the same season when the current, which produces them, descends from that pole. They may see a very sensible picture of these retrograde effects in running water, at the arch of the bridge of Notre Dame, which is next to the quay Pelletier. The course of the Seine being directed

who proved it. Other Europeans had maintained, before Columbus, that there was another hemisphere, but he was the first person, notwithstanding, who discovered it. If others, in like manner, have said, that the tides come from the poles, no one believed it, because they said so without giving any proofs. Before I could collect mine, and place them in a striking point of view, it was necessary to dissipate those thick clouds of venerable error, such as that of the poles being flattened and washed by seas free from ice, which had been spread between us and truth by our pretended sciences, and which were capable of involving all our physics in eternal darkness. The glory, then, to which I have aspired, is that of collecting a few of the harmonies of nature, in order to form of them a concert which should raise man towards his Creator; or rather, I have

obliquely by a kind of dam against one of the piers of that arch, produces an eddy, which continually ascends against the current of the river as far as the bubbling over of the dam. In like manner, the melted ice of the northern regions descends in summer from the bays near the polar circle, running at the rate of eight or ten leagues an hour, according to Ellis, Linschotten, and Barents. These waters flow towards the south in the middle of the Atlantic Ocean; but meeting on their edges, and almost in front, with Africa and America, they are forced to flow back to the right and left, along these continents, and to proceed towards the north beyond Capes Boiador and St. Augustine, which are rendered famous by their currents. But as the sources from which they set out have an intermittent flux of acceleration and retardation, occasioned by the diurnal and nocturnal action of the sun on the ice of the eastern and western hemisphere of the pole, their lateral counter-currents, that is, their tides, have a similar intermittent flux.

sought only for the happiness of becoming acquainted with and diffusing them; for I am ready to adopt any other system which shall exhibit to the mind of man greater probability, and to his heart a better consolation. Glory belongs to God alone, and peace to man; and the latter is never so pure and so profound as in the sentiment of that very glory which governs the universe. My sole ambition has been to discover some of its new rays; and I wish, in future, for no other felicity than that of being enlightened by it during the rest of my life, to the exclusion of that illusory, inconstant, and unsatisfying glory, which the world gives and takes away according to its pleasure.

I have been thus diffuse on the right which I claim to the discovery of the cause of currents and the tides by the melting of the polar ice, because, having opposed to the greater part of the received opinions, many observations which are my own, if each of them required a manifesto to support it, I should find myself adequate to the task. Beside, if they shall acquire so much celebrity as to procure me, according to the spirit of the age, perfidious praises, secret persecution, affected sympathy, and, to destroy my uncertain, slow, and as yet hardly budding fortune, I declare, that, adhering to no party, and able to oppose only myself to each new enemy, instead of having recourse to the public papers, as is the custom, in order to pour forth recriminations, abuse, complaints, and lamentations, and thus to waste time to no purpose, I shall defend

myself on my own ground alone; and shall oppose to my enemies, whether secret or avowed, nothing but truth. Its mirror shall be my egis; and the image of each will become there a Medusa's head. Or rather, may it be my lot, at a distance from fickle and deceitful men, under the roof of a small rustic cot which I can call my own, and situate on the border of some wood, to disengage the statue of my Minerva from her trunk, and at length lay a whole world at her feet!

In short, if the journalists have refused me their suffrages, respecting objects of so much importance to the natural sciences; and if others are endeavouring, by anticipation, to deprive me of the public approbation, I can boast of already enjoying that of several enlightened men in every rank of society. The Serbonne, to whom I am personally unknown, did me the honor to adopt the new proofs of the general deluge, which I have drawn from the total melting of the polar ice; and which have been introduced into one of their theses, supported for the first time by the Abbé de Vigueras, in his *Majeure* of the 6th of July 1785. After all, if the journalists had even testified still more repugnance to give an account of opinions, so contrary to those of academies, so new to the greater part of them, and which must have become suspicious from this very circumstance, they have made me a very ample indemnification, by bestowing on me more praise than I deserved, as to moral qualities, which are far preferable to phy-

sical discoveries, and to which I should deem myself singularly happy to attain.*

I have to congratulate myself, then, only on the general interest with which the public have received the moral part of my work. I have, however, omitted many very important objects of moral and political reform; some, because I was not at liberty to treat them according to my conscience, and others, because they were not consistent with my plan. I confined myself to those abuses only which government can remedy; but there are others, equally general, which depend on national manners alone. Such in particular is the celibacy of the greater part of domestic servants. Had I been able to enlarge on this subject, I should have shewn that the convenience of society ought never to contravene the laws of nature; that it is the interest of masters to promote marriage among their domestics, because they are sure to pay, in the event, the expence of their obscure libertinage, an expence more considerable, without doubt, than that of an honest establishment, as a concubine always spends much more than a lawful wife. I should have shewn the influence which the bad

* I ought, certainly, to distinguish, among the number of my panegyrists, the two first writers who have given an account of my work. The one, notwithstanding the shortness of his journal, and his love of criticism, announced it in the most favorable manner; and the other, destined for the defence of morality and religion, has placed me by the side of a man, at whose feet I should have thought myself happy to have lived, had I existed at the same period.

morals of unmarried domestics have upon the children of their masters. I should have spoken also of the cruelty of our pretended fathers of families, who abandon their servants when they are attacked by the slightest disorder, when they become old, or when they have children; of the obligation they lie under to relieve the want of these men, who are their natural friends, the victims of their faults, the witnesses of their foibles, and the sources of their reputation, whether good or bad. I should have insisted on the necessity of restoring, at least, the first rights of humanity to these unfortunate beings, deprived of the greater part of the privileges that belong to citizens. I should have demonstrated, how much their happiness influences that of families, as well as that of a nation, by giving the picture of a few families in Prussia, where I have seen, in general, the domestics full of zeal, love, respect, and fidelity for their masters, because they are born, marry, and die in their houses, and continue there, from father to son, for two or three centuries.

To conclude, if I have enlarged on the disorders and intolerance of corps and associations, I have at the same time respected states. I have attacked particular bodies, to defend that of the country, and, above all, the great body of mankind, of which we are all members. But God forbid that I should give pain to any private individual, any sensible being, since I took up my pen solely to accomplish what is implied in the motto prefixed to my work : *Miseris succurrere disco*. Whatever then, my dear reader, may

be your situation in life, I shall be satisfied with your sentence, if you try me as a man, respecting a work, the grand object of which has been the happiness of man. On the other hand, if I have had the honor of affording you any new pleasure, and of extending your views in the boundless and mysterious field of nature, reflect, after all, that these are merely the faint perceptions of a man; that, compared with what remains to be known, they are nothing; that they are the shadows only of eternal truth, collected by a shadow; and that a few rays of that sun of intelligence, with which the world is filled, have been sporting on a drop of turbid water.

“ There are yet hid greater things than these be,
“ for we have seen but few of his works.” *Ecclesiast.*
chap. xliiii. v. 36.

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ERRATUM.

Vol. I. page 14, line 9, for *thirty* read *thirty thousand*.

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STUDIES OF NATURE.

STUDY I.

IMMENSITY OF NATURE: PLAN OF MY WORK.

MY design, of writing a general history of nature, in imitation of Aristotle, Pliny, chancellor Bacon, and some modern authors of celebrity, was formed several years ago. The field appeared so ample, that, whoever had gone before me, I could not suppose it to be entirely explored. Nature, beside, invites to the study of her works, men of every age and country; and, though her choice and hidden treasures are promised to the discoveries of genius alone, some fruits are yet reserved for the less literate and informed; for men, especially, like myself, who pause at every step, transported with the beauties of her divine productions. I was led to this arduous undertaking, by a desire of meriting the good opinion of my fellow men, and particularly of my illustrious benefactor Louis XVI. who, like Titus, and Marcus Aurelius, devotes all his thoughts to the happiness of mankind. It is in nature alone that we must seek for the laws of nature, and it is only by departing from her laws, that we experience evils, and involve ourselves in difficulties and distress. I con-

ceived, therefore, that to study nature, would be to serve both the country in which we live, and humanity at large. I have employed, in my investigations, all the powers of my reason, and, though my means have been slender, I can truly say, that a day has not passed without some agreeable observation having been added to my stock. I intended, at first, not to begin my work till I had done with observing, and the materials necessary to a history of nature were completely collected: but I thought, in this respect, like a child, who, with a shell, digs a hole in the sand, to hold the vast waters of the ocean. Nature is of infinite extent, and I am myself a being of very limited capacity. Not her general history only, but that of the most diminutive plant, surpasses all the efforts of my mind. It was upon the following occasion, that I became convinced of this truth.

One summer's day, as I was arranging some observations I had made upon the harmonies of this terrestrial globe, I perceived on a strawberry plant, that happened to be in my window, some winged insects, of so beautiful a colour, that I left the occupation in which I was engaged to describe them. Next day, there appeared upon the plant another sort, which I also described; and, in the space of three weeks, I had obtained thirty-seven distinct species: but they came, at last, in such numbers and variety, that I was obliged to relinquish this study, amusing as it was, for want of leisure, and, to speak the truth, for want also of powers to describe them.

The insects I had observed, were distinguished from each other by their colours, their forms, and their motions. They resembled gold, silver, brass; were blue, green, brown, chestnut; and some were spotted and others striped. The head of one species was of the shape of a turban, while that of another was elongated like the point of a nail. In this, it was dark as a tuft of black velvet; in that



it sparkled like a ruby. Their wings also were equally remarkable for variety. In some, they were long and brilliant, like thin plates of mother-of-pearl; in others, short and broad, and formed like the net-work of the finest gauze. Each species also had its own manner of disposing and managing them. Some carried them perpendicularly, others horizontally, and they seemed to take pleasure in extending them. Some flew with the motion of a butterfly; others darted into the air, and directed their course against the wind, by a mechanism nearly similar to that of a paper-kite, which, as it rises, forms, I think, with the axis of the wind, an angle of twenty-two degrees and a half. Some alighted on the leaves to deposit their eggs, others merely to shelter themselves from the sun. But the views of the greatest part of them were wholly unknown to me; for, while some were incessantly in motion, always coming and going others continued nearly at rest, moving only the hinder part of their body, and others were entirely motionless, and, for ought I know, engaged, like myself, in making observations. The common tribes of insects, attracted by my strawberry plant, I disdained to regard, as being already sufficiently known; such as the snails, that nestled under its leaves; the butterflies, that fluttered around; the beetles, that worked at the roots; the little worms, that insinuated themselves, and were able to live in the parenchyma, that is, in the mere thickness of a leaf; the wasps and honey-bees, that sipped the fragrance of the flowers; the vine-fretters, that sucked the juices of the stem; the ants that licked up the gnats; and lastly the spiders, that spread their snares every where in the neighbourhood, to find, in these unwary insects, a prey with which to satisfy their hunger.

Diminutive as were these objects, they had merited the attention of nature, and could, therefore, not be unworthy of mine. As she had assigned them a place in the universe, it would have been impossible for me, in my general his-

tory, to have left them out. Had the strawberry plant been the particular subject of my investigation, for a still stronger reason, must they have borne a part in it. Plants are the habitations of insects, and to write the history of a town, without giving an account of its inhabitants, would be absurd. Meanwhile, my strawberry plant was not in its natural situation. Instead of being in the open country, by the side of a wood, or the border of a rivulet, it was confined to a pot of earth, amidst the thick smoke of Paris. I observed it only at my intervals of leisure, and was ignorant by what insects it was visited in the course of the day, and still more of those which might come to it by night, attracted by its simple emanations, or, perhaps, by a phosphoric light, so subtle as to escape our senses. I was ignorant, too, of the different tribes that might resort to it at other seasons of the year, as well as of the various relations it might have with reptiles, amphibious animals, fishes, birds, quadrupeds, and especially with man, who has the folly to despise every thing which he is unable to convert to his own use.

I may add, that it was not sufficient to look down upon it, if I may so speak, from the heights of my greatness; for, in that case, my knowledge would have been surpassed by that of the meanest insect that inhabited it. Not one of them, inspecting it with his little spherical eyes, but must have distinguished a thousand objects, imperceptible to me, without the aid of a microscope, however assiduous might be my research. Their eyes, indeed, are greatly superior to this instrument, which shews us only such objects as are in its focus, that is, at the distance of a few lines; whereas, by a mechanism with which we are totally unacquainted, they perceive both things that are near and things that are distant. Their eyes are at once microscopes and telescopes, and, by their circular position round the head, are able to view, at the same instant, the whole compass of the hea-

vens, while those of the astronomer can, at most, embrace but the half. Accordingly, with this advantage of sight, my insects must discern at a glance, in my strawberry plant, an arrangement and combination of parts, that, even with the microscope, I can observe only separate from each other, and one at a time.

On examining the leaves of this plant, by means of a lens, which had no extraordinary power of magnifying, I found them divided into compartments rough with bristles, separated by canals, and strewed with glands. These compartments appeared to resemble large verdant pastures, their bristles to be vegetables of a particular order, of which some were erect, some inclined, some forked, some hollowed into tubes, from the extremity of which issued a few drops of liquid; and their canals, as well as their glands, seemed to be filled with a sparkling fluid. In different species of plants these bristles and canals have other forms, colours, and fluids. There are glands, even, not unlike to basons, round, square, and radiated. Now, nature has made nothing in vain. There is no place fit for a habitation, but she has peopled it. The narrowest space is no hindrance to her. She has placed animals with fins in drops of water, and in such multitudes, that the philosopher Leewenhoeck has counted thousands. Many since his time, and, among the rest, Robert Hook, have discerned in a single drop no bigger than a grain of millet, ten, thirty, and some even the astonishing number of forty-five thousand. Those readers who have never considered how far the patience and sagacity of an observer may be carried, will be inclined, perhaps, to doubt the accuracy of these observations; but Lionnet, by whom they are related, in Lefser's *Theology of Insects*,* has proved its possibility by a very simple process. The existence of such beings is, at

* Book ii, chap. 3. last note.

least, certain, and drawings have been made of their different figures. Others have been found, with feet armed with claws, living upon the body of a fly, and even upon that of a flea. Why then, reasoning from analogy, may we not suppose, that there are animals grazing on the leaves of plants, like cattle in our meadows and on our mountains, reposing under the shade of a down imperceptible to the eye of man, and quaffing their gold and silver beverage from goblets, formed in the glands of the plant like so many suns? The different parts of the flowers must exhibit to them spectacles, of which we can have no idea; the yellow antheræ, suspended by white fillets, must resemble, in their eyes, double rafters of gold, balanced on pillars fairer than ivory; the corolla must appear like a vast arch, studded with the ruby and the topaz; the nectarium like rivers of liquified sugar; and the other parts of the blossom like cups, urns, pavillions, and domes, which the human architect and goldsmith have not yet imitated.

I am not speaking from conjecture; for I one day examined, with a microscope, the flowers of thyme, and, to my utter astonishment, I distinguished in them superb flaggons, with a long neck, of a substance similar to the amethyst, from the gullets of which seemed to flow ingots of liquid gold. In like manner, when I have examined the corolla of the smallest flower, I have always observed that it was composed of an admirable substance, half transparent, studded with brilliants, and impregnated with the most lively colours. The beings who live under so rich a reflexion, must have ideas of light, and of the various phenomena of nature, very different from ours. A drop of dew, as it filters in the capillary and transparent tubes of a plant, must exhibit to their eyes a thousand waterfalls; the same drop, spherically suspended at the extremity of one of the bristles of the plant, must appear like an ocean without a shore, and, when evaporated into air, like an aerial sea.

Accordingly, to them, fluids must ascend, instead of falling; assume a globular form, instead of seeking a level; and, contrary to the laws of gravity, mount into the sky, instead of being attracted to the earth. The ignorance of these beings must be as wonderful as their knowledge. As they are conversant only with the minutest objects, the connexion and harmony of great ones must escape them. They are, doubtless, ignorant that there are such creatures as men, and, among these men, learned individuals, who know and can explain every thing; who, transient, like themselves, plunge into an infinity of greatness, in which they are lost; while they, on the other hand, by means of their diminutiveness, are acquainted with an opposite infinity, in the smallest divisions of matter and time. Among these ephemeral beings there must be found the youths of a single morning, and the old age and decrepitude of a day. If they have historical records, their months, years, ages, and epochs must be proportioned to the duration of a flower. Their chronology must be different from ours, as their hydraulics and optics are different. Thus, in proportion as man brings under his inspection the elements of nature, how do the principles of his science disappear!

Such must have been my strawberry plant, and its natural inhabitants, in the eyes of my insects. Let us suppose, that, like them, I had been able to acquire an intimate knowledge of this new world, I should still have been unacquainted with its history; for, to know this, I must have studied its relations with the other parts of nature; with the sun, that expands its leaves and its blossoms; with the wind, that every year scatters and sows its seed; with the brooks and rivulets, the banks of which it strengthens and embellishes. I must have discovered how it preserves itself, in winter, against frosts of so penetrating a nature that stones are split asunder; how, in spring, it should recover its verdure, without any pains having been taken to shelter

it from the inclemency of the weather; how, feeble and creeping upon the ground, it should be able to ascend from the deepest vallies to the summit of the Alps, traverse the globe from north to south, from mountain to mountain, forming as it goes a thousand pieces of charming net-work, by mingling its fair flowers and rose-coloured fruit with the plants of every climate; how it has reached from the mountains of Cachemire to Archangel, and from the Felices in Norway, as far as Kamschatka; how, in short, we find it in both climates of America, though numberless animals are waging universal war upon it, and no gardener gives himself the trouble to replant its shoots or sow again its seeds.

But supposing all this knowledge to be obtained, I should still have the history of the genus only, and not that of the species. The varieties would yet remain to be known; and they have all a distinct character, derived from the manner in which they bear their flowers, whether singly, in pairs, or in clusters; from the smell, taste, and colour of their fruit; from the size, figure, edging, and the smooth, or downy clothing of their leaves. One of our most celebrated botanists, Sebastian Le Vaillant,* has found in the environs of Paris, five distinct species of strawberry, three of which bear flowers without producing fruit. In our gardens we cultivate no less than twelve different sorts of strawberries from foreign countries. We have one from Chili, another from Peru, a third from the Alps, which is perennial, a fourth from Sweden, which is green, &c. &c. But how many varieties are there wholly unknown to us! Has not every degree of latitude a species of its own? May there not be trees that bear strawberries, as there are trees that bear peas and beans? May we not consider as varieties of the strawberry, the numerous species of the raspberry and

* *Botanicon Parisiense*.

bramble, with which it has a striking analogy, from the shape of its leaves, from its tendrils, which creep along the ground and replant themselves, and from the form of its blofsoms and the nature of its fruit, the seeds of which are on the outside? Is it not also, by its flower, related to the eglantine and the rose tree; by its fruit to the mulberry; and by its leaves to the trefoil itself, one species of which, not uncommon in the environs of Paris, bears its seeds in the form of a strawberry, a circumstance from which it derives the name of *trifolium fragiferum*,—the strawberry-bearing trefoil? Now, if we add to all this, the consideration, that these different species, varieties, analogies, and affinities, have, in every latitude, necessary relations with a multitude of animals, and that these relations are wholly unknown to us, we shall find, that a complete history of the strawberry plant would furnish ample employment for all the naturalists in the world.

What, then, would be the task, if we attempted to write similar history of all the different vegetables scattered over the face of the earth? The celebrated Linnæus enumerates from seven to eight thousand species; and he had not travelled. The famous Sherard was acquainted, it is said, with sixteen thousand; another botanist swells his catalogue to twenty thousand; and another, still more modern, boasts of having collected himself no less than twenty-five thousand, and supposes those which have not fallen under his observation, to be four times the number. But these calculations must appear infinitely short of the truth, if we consider, as has been remarked by the preceding botanist, that we know very little of the interior parts of Africa, of the three Arabias, and even of the two Americas; that we know as little of New Guinea, New Holland and Zealand, and the innumerable islands in the South Sea, the greater part of which are themselves as yet undiscovered. The same may be said of Ceylon and Madagascar, of the

immense Archipelagos, of the Philippines and the Moluccas, and of almost all the Asiatic islands; and, as to the vast continent itself, if we except some great roads in the interior, and those parts of the coast to which Europeans resort for traffic, we may assert, that it is wholly unknown to us. In Tartary, in Siberia, and even in many of the kingdoms of Europe, what large tracts of country are there, which the foot of a botanist has never trod! Some, indeed, have given us an herbal of Malabar, Japan, China, &c. but if we reflect, that these travellers never penetrated into these countries beyond the sea-coast; that their researches were often confined to one season of the year, when a part only of the plants peculiar to each climate were to be seen; that they have merely visited some few places, of small extent, in the vicinity of our European factories; that they have never ventured into the deserts, where they would have found neither subsistence nor guide; nor mixed themselves with the numerous tribes of barbarous nations, whose language they did not understand; we shall be satisfied that their boasted collections, valuable as they may be, are nevertheless extremely imperfect.

To be farther convinced of this, let us compare the time spent by those travellers, in making their collections of plants, in a foreign country, with that which was employed by Le Vaillant, in collecting those only which grew in the vicinity of Paris. The learned Tournefort had already explored this field, and, after the researches of so indefatigable a master, one would have supposed, that all the botanists of the capital might have rested from their labours. Le Vaillant, however, his pupil, had the courage to explore it again; and he found so considerable a quantity, which had escaped the eye of his predecessor, that he doubled, at least, the catalogue of our plants. He has extended their number to fifteen or sixteen hundred; without including, in his enumeration, those which differ only in the colour of

the flowers and the spots of the leaves, though these are signs which nature often employs in the vegetable kingdom, to distinguish the species, and illustrate their true characters. Hear what Boerhaave, his illustrious editor, says of his laborious researches: "He devoted himself to this arduous undertaking, from the year 1696 to March 1722, and, during so long a period, was unweariedly employed in his work. He pried into every recess of nature, and never passed the smallest patch of ground without examining the plants that grew upon it. Roads, fields, vallies, mountains, gardens, woods, pools, morasses, rivers, banks, ditches, and wells, were equally explored by him. Perseverance, like this, could not fail of success, and he frequently discovered a number of things which the attention of Tournefort, vigilant as it was, had completely overlooked."* Thus it appears, that Sebastian Le Vaillant employed no less than twenty-six years, in his own country, and often with his pupils to assist him, in completing a botanical description of the plants of a few square miles; whereas the persons who have furnished us with catalogues of foreign plants, were alone in the respective countries, had no one to assist them, and dispatched the business, perhaps, in a few months. Meanwhile, though the labour and sagacity of this botanist seem to have left us nothing to desire, I have my doubts whether he has collected all the treasures which the kindness of Flora has scattered round our city, and whether, to use a figurative expression, he has searched to the bottom of her basket: For Pliny observed plants in places which are not included in Boerhaave's enumeration, which grew on the tiles of houses, on rotten sieves, and on the heads of ancient statues; and we are, beside, continually discovering, in the neighbourhood of Paris, species that are not to be found in Le Vaillant's *Botanicon*.

* *Botanicon Parisiense*, præfatio, p. 3 & 4.

For myself, if I were allowed a conjecture, as to the number of plants of distinct species which nature has spread over the globe, such is my idea of her immensity and her many subdivisions, I should say, that there is not a square mile of earth, which does not contain some one plant peculiar to itself, or, at least, that grows better there, and looks more beautiful, than it would in any other part of the world. By this calculation, the number of indigenous vegetables would amount to as many millions, as there are millions of square miles upon the solid surface of the globe. The farther we advance to the south, the more their variety in the same given space, will be found to increase. The island of Taity, in the South Sea, has a vegetable kingdom to itself, perfectly distinct from that of other places, under the same latitude, in Africa and America, and even from that of the adjacent islands. And if we reflect that, in its own country, every plant has several different names, that every foreign country adds another name, and that all these names, or at least the greater part of them, are continually varying with the lapse of time, what difficulties does not the nomenclature alone oppose to the study of botany?

In the mean time, these discoveries would be merely introductory, and would constitute but a vain and imperfect science, were we even acquainted, in the most complete detail, with all the parts of which plants are composed. Their form and combination, their attitude, mien, elegance, and the harmonies that exist between them, when grouped, or found in contrast with each other, would still be undetermined; and this branch of the subject, which is the most interesting of all, I am not aware has been so much as touched upon. Their virtues too, are, in general, unknown, or else neglected and abused; and their qualities often perverted, in making the most cruel experiments on inoffensive animals, while they might be usefully employed as remedies, to counteract the ills of human life. - For instance, in the

royal cabinet at Paris, there are arrows more formidable than were those of Hercules, though steeped in the blood of the Lernean hydra. Their points are impregnated with the juice of so venomous a plant, that though exposed to the air for many years, they will destroy in a few minutes, with the slightest puncture, the stoutest animal that exists. The blood of the victim, trifling as may be the wound, instantly congeals; but if a small quantity of sugar be immediately swallowed by him, the circulation is as quickly restored. Both the poison and the remedy were discovered by savages inhabiting the banks of the Amazon; and it is pleasing to observe, that this deadly weapon is never employed in their wars, but confined solely to the chase. Why have not Europeans, who boast of being so humane and enlightened, tried the effect of this poison, in diseases where the blood quickly dissolves, and of the sugar, where it suddenly coagulates? Alas! how can it be expected that we should be thus benevolent, and convert to the preservation of the human race, the malignant and destructive qualities of a foreign vegetable, who employ to our mutual destruction, those very blessings, which were bestowed by the hand of nature, that we may lead a happy and innocent life? The elm and the beech, under the cool shade of which our shepherds are wont to dance with their mates, are cut down, and made into carriages, for the support of the thundering and destructive ordnance. With the juice of the vine, which providence has given us for the purposes of amity and conciliation, we intoxicate our soldiers to madness, that they may murder each other without remorse or enmity. With the lofty firs, planted amidst the snows of the north, to shelter and warm the inhabitants, masts are made for the vessels of Europe, employed to carry fire and destruction among the peaceable tribes of the southern hemisphere: while the canvas, which should clothe our rustic villagers, is formed into sails for the corsair, whose

spirit of depredation leads him to the remotest India : and thus, our crops and forests, wafted across the ocean, serve as instruments for spreading desolation over the old world and the new.—But leaving the history of man, let us return to that of nature.

If from the vegetable, we pass to the animal kingdom, a field infinitely more extensive will open before us. A learned naturalist of Paris has told us, many years ago, that he possessed a collection of more than thirty different species of animals. I am ignorant whether the king's magnificent cabinet contain as many ; but this I know, that his plants amount only to eighteen thousand, and that in the royal Botanic Garden no more than six thousand are cultivated. This number of animals, however superior it is to that of vegetables, when compared with what exists upon the face of the globe, must sink into nothing. When we reflect, that every species of plant is a point of union for different kinds of insects, and that among these plants, there is not perhaps one, but what has some species of fly, butterfly, gnat, beetle, lady-bird, or snail, peculiar to itself ; that these insects serve for food to other numerous species, such as the spider, the dragon-fly, the ant, the formicaleo, and to immense families of small birds, of which many classes, such as the wood-pecker and the swallow, have no other nourishment : when we reflect again, that these birds, in their turn, are devoured by birds of prey, such as kites, falcons, buzzards, rooks, crows, hawks, vultures, and others ; that the general spoil of these animals, swept away by the rains, carried into rivers, and thence into the sea, becomes the aliment of almost innumerable tribes of fishes, to many of which the naturalists of Europe have as yet given no name : when we proceed a step farther, and consider, that numberless water-fowls prey upon these fishes,—have we not reason to suppose, that every species of the vegetable kingdom, serves as a basis to numerous species of the animal kingdom,

which multiply around it, like the rays of a circle round its centre? In the mean time, I have included in this cursory list, neither quadrupeds, of which there is an abundance of every degree of magnitude, from the mouse living under the grass, to the camelopard feeding on the leaves of trees fifteen feet from the ground; nor amphibious animals; nor birds of night; nor reptiles; nor polypuses, so little known; nor marine insects, some families of which, the crab and shell-fish, for example, would fill of themselves our largest cabinets, though but a single individual of each species was to be collected; nor many other kinds of insects, as the louse and the worm, of which every species of animal has its particular varieties, and which triple, at least, the whole kingdom of creatures that live by respiration; nor have I mentioned the Madrépore, with which the sea is paved between the tropics, and of which the species are so many, that I have seen, in the isle of France, two large apartments filled with those which had been found in the vicinity of that isle, and of which no two specimens were alike; nor, lastly, the myriads of living things, visible and invifible, known and unknown, which have no fixed determination, and which, nature with lavish hand, has scattered through the air, the earth and the waters.

How immense, then, would be the undertaking, to describe each of these beings with the sagacity of a Reaumur? The whole life of a man of genius would scarcely be sufficient to write the history of a few insects only; and curious as are the memoirs with which we have been furnished, by some learned individuals, respecting the manners and conformation of those animals which are most familiar to us, we shall flatter ourselves in vain if we suppose from thence that we have obtained a thorough acquaintance with them. The principal knowledge would, in my opinion, still be wanting: which is the origin of their friendships and their enmities. This, I conceive, must constitute the essence of

their history, since to this must be referred their instincts, their loves, their wars, their attire, their arms, and the very form itself which nature has given them. A moral sentiment seems to have determined their physical organization. Yet I know of no naturalist who has engaged in a research of this kind. Poets alone by their ingenious fables have endeavoured to explain these wonderful instincts. The swallow Progné flies the forest, while her sister Philomela delights to warble in its solitary recesses. Progné thus, one day, addresses her :

Le désert est-il fait pour talens si beaux ?

Venez faire aux cités éclater leur merveilles :

Aussi bien, en voyant les bois,

Sans cesse il vous souvient que Térée autrefois,

Parmi des demeures pareilles,

Exerça sa fureur sur vos divins appas.—

Et c'est le souvenir d'un si cruel outrage,

Qui fait, reprit sa sœur, que je ne vous suis pas :

En voyant les hommes, hélas !

Il m'en souvient bien davantage.

“ Is it in the desert that talents so beautiful should take up their abode ? Come with me, and astonish, with their lustre, cities and the haunts of men. Nor is it possible, inhabiting, as you do, the depth of woods, you should not incessantly recollect, that, in such a solitude, Tereus formerly did brutal violence to your spotless charms.”—“ You mistake, replies her sister ; it is the idea of that calamity that forbids me to follow you : I may recollect it in my retirement, but the sight of men brings it to my remembrance in much greater bitterness.”

I never hear the enchanting and melancholy lays of a nightingale, shrouded in the leaves of the thorn, and the lengthened *piou-piou*, which interrupt, like sighs, the music of her song, without being tempted to believe, that nature revealed the adventure of this solitary bird to the sublime La Fontaine, when she inspired him to compose these

verses. If I did not know his fables to be the history of human beings, I should consider them as a supplement, at least, to that of animals. There are philosophers of celebrity, unfaithful to the testimony of their reason, and conscience, who have dared to represent all creatures but man as mere machines. They attribute to them blind instincts, which regulate uniformly their actions, without passion, without will, without choice, and even without the smallest sensibility. I was one day speaking of this, to J. J. Rousseau, and expressed my surprize, that men of genius should have maintained so extravagant a doctrine: "the solution," said he, sagaciously, "is this, when man begins to reason, he ceases to feel."

To refute the opinion of such philosophers, I shall not have recourse to animals, whose industry and economy excite our astonishment, as the beaver, the bee and the ant; but shall cite a single example from a class the most indocile, which is fish, and from a species, in that class, governed by an instinct the most impetuous and stupid, which is gluttony. The shark is so extremely voracious, that he not only devours his fellow-tenants of the sea, but will swallow, without distinction, whatever may fall from a ship, cordage, cloth, pitch, wood, iron and even knives. Meanwhile, there are two remarkable circumstances under which I have observed him uniformly practising forbearance. The first relates to a small species of fish, speckled with yellow and black, called the pilot-fish, which, however tormented by hunger, he will never touch: they swim before his snout and guide him to his prey, which he can scarcely perceive till he approaches close to it, nature, as a counter-balance to his ferocity, having rendered him almost blind. The other instance is this, if you throw into the sea a dead fowl, the noise occasioned by the fall, will bring him to the spot, but he no sooner discovers it to be a bird than he immediately retires; which has furnished sailors with a

proverb, *the mighty shark flies from a feather*. In the first of these instances, it is impossible not to ascribe to him a portion of understanding, which represses his voracity in favour of his guides; and the second must be attributed to that universal reason, which, destining him to live among the shallows, where the cadaverous substances of whatever perishes in the sea are to be found, inspires him with an aversion for the feathered race, that he may not destroy the numerous tribes which swim on its surface, and which are employed, like himself, in seeking their livelihood, and cleansing the shores from impurities.

There are other philosophers, on the contrary, who have ascribed the manners of animals, like those of men, to their education; and their natural affections, as well as their enmities, to similitude or dissimilitude of form. But if their friendships be the result of their resemblance, how comes it, that the hen, who walks at the head of her brood, and feeds, without fear, among the horses and oxen of a farm yard, by whose feet a part of her family is frequently crushed, should, at sight of the hawk, a feathered animal not unlike herself, who appears in the air as a black point, and whom, perhaps, she has seldom seen, collect her young, with anxious solicitude, under her wings? Why does the dog, placed as a watch by night, begin instantly to bark, at the smell only of a wolf, which so nearly resembles himself? If long-standing habits had their influence upon animals, as upon men, how is it that we can render the ostrich of the desert so familiar to our hands, that he shall carry our children upon his plumeless crupper, while the swallow, who, from time immemorial, has built his nests in our houses, the whole skill of man has been unable to tame?

Among the historians of nature, where is the Tacitus to be found, who shall unveil to us these mysteries of the cabinet of heaven, without an explanation of which it is

impossible to write the history of any animal upon the earth? Not a single species has ever been seen deviating, like man, from the laws which it has received from nature. Bees, every where, live in republics now, as they lived in the days of *Æsop*. The common flies have always been vagabonds, like wandering savages, without police or restraint. How is it that no *Lycurgus* has risen among them, to assemble them together for the public good; to prescribe laws to them, dictated by their wants and the necessity of uniting in society, as philosophers tell us did the first legislators among men? Or, on the other hand, as *Machiavel* affirms of nations possessing too much happiness, how happens it, that among the canine species, exulting in the abundance of their strength, no *Catiline* has started up, inviting his associates to take advantage of the security of their masters, and destroy them at once?—or no *Spartacus*, rousing to liberty, by his howlings, those to whom nature has given arms, courage, and skill to subdue, in bodies, the most formidable animals, that they may live as sovereigns of the forest? When so many trivial laws of nature, passing immediately before our eyes, are unknown to us, how dare we point out those which regulate the course of the stars, and embrace the immensity of the universe?

To these difficulties opposed to us by nature, others may be added which we occasion ourselves. First, methods and systems of all kinds beget in every man a manner of viewing things peculiar to himself. I am not speaking of metaphysicians, who explain every phenomenon of nature by means of abstract ideas; nor of algebraists, with their formulas; nor of geometers, with their compasses; nor of chemists, with their salts; nor of the revolutions which their opinions, though intolerant in the extreme, undergo in every age. I shall confine myself to those notions which are the most universal, as well as the most credited and esteemed. And to begin with geographers. They

represent the earth as divided into four principal parts, whereas, in reality, it is only divided into two. Instead of the rivers that water it, the rocks which form its barriers, the chains of mountains which partition it into climates, and other natural subdivisions, they exhibit it to our view speckled with parti-coloured lines, which divide and subdivide it into empires, dioceses, principalities, electorates, bailiwicks, and magazines of salt. They have disfigured the names of places, or substituted others, without a meaning, in the room of those which the primitive inhabitants of every country had given them, and which so forcibly expressed their nature.—They call, for instance, a town near that of Mexico, where the Spaniards have so often shed torrents of human blood, by the name of *Angel Town*, instead of preserving the expressive appellation given it by the Mexicans, of *Cuet-lax-coupan*, that is, *The snake in the water*, because, of two fountains; which are found in the town, one is poisonous; the great river of North America, which the natives denominate *Mechassipi*, *the father of waters*, they change into *Mississipi*; the high mountains bordering on the South Sea, the summits of which are eternally covered with snow, and thence called by the Peruvians, in the royal language of the Incas, *Ritisuyu*, bears in their vocabulary the appellation of the *Cordeliers*; and so of a thousand other names. They have robbed the works of nature of the characters that distinguished them, and nations of their monuments. In reading the ancient names of places, with their explanation, in Garcillaso de la Vega, in Thomas Gage, and the earliest navigators, the mind, by means of a few simple words, is presented with a picture, as it were, of every country, and, in a manner, penetrates into its history; without taking the respect attached to antiquity into the account, which renders the places, described by these writers, still more venerable. The Chinese, is some of their countrymen did not traffic with Europeans,

would be ignorant that their country is called China. They call it themselves *Chium-hoa, the middle kingdom*. When the families of their sovereigns become extinct, the name is changed. A new dynasty gives it a new appellation. The intention of the law, by this custom, was to instruct kings, that the destiny of their people is attached to them, in the same manner as is the destiny of their own family. Europeans have destroyed all these correspondencies; and they are sure to be punished for this, as for their other acts of injustice; since, by presuming to give what names they please to the countries which they seize upon or settle in, it happens that, when you see the same places in maps, or find them in books of travels, Dutch, English, Portuguese, Spanish, or French, you are able no longer to recognise them. The very longitude even is changed,—every nation counting now from the meridian of its own capital.

Botanists contrive to mislead us still more than geographers. I have already spoken of the continual variations of their dictionary; but the method employed in their science is equally faulty. To distinguish plants from each other, they have devised the most complicated characters, which frequently mislead themselves, though they derived them from all the parts of the vegetable kingdom; and as to the individual combination of a plant, they have never been able to furnish so simple a description, as that the unscientific and illiterate shall immediately know it. To class the trees of a forest, they must have their magnifying glasses and their scales. It is not sufficient to see them standing, and covered with leaves, they must examine also their flowers, and sometimes even the fructification of those flowers. The clown knows them all in the boughs that compose his faggot. To give me an idea of the varieties of germination, they show me, in bottles, a long series of naked grains of all forms: while it is the capsule that preserves

them, the downy tuft which resows them,^o the elastic branch which darts them to a distance, that it imports me most to examine. To show me the character of a flower, they present it to me dry, discoloured, and spread upon the leaf of a book. Is this the state in which I can distinguish a lily? Is it not rather on the brink of a rivulet, when it raises its stately stalk over the surrounding verdure, and reflects in the limpid stream its beautiful calixes,* whiter than ivory, that I ought to contemplate and admire this king of the vallies? Is not its incomparable whiteness, when spotted, as with drops of coral, by the little scarlet lady-birds, hemispherical in their form, and regularly speckled with black, which constantly resort to it as an asylum, rendered, by the contrast, still more dazzling? Is it possible to discover the queen of flowers in a dried rose? To be an object at once of love and philosophy, must it not be viewed, when, issuing from the clefts of a humid rock, it shines on its native tapestry; when zephyr balances it on its thorny stem; when Aurora has bedewed it with her tears, and, it invites by its lustre and its fragrance, the hands of lovers? A cantharis, lurking in the corolla of a rose, frequently heightens, by his emerald dress, the glowing carmine; and then it is this flower seems to say to us, That, emblem of pleasure, from its charms and the

* Botanists tell us, that the lily has no calix, but merely a corolla consisting of many petals. The flower of a plant is what they call a corolla, and the case which contains the flower a calix. This is evidently an abuse of terms. Calix, in Greek and in Latin, means a cup, and corolla a small coronet. Now an infinite number of flowers, as, for instance, the cruciform, the papilionaceous, those with long throats, and a multitude of others, are not formed like a coronet, nor their cases like cups: and had botanists given the simple name of case, or wrapper, to the parts which protect the flower before it blows, I will venture to affirm, that they would have been on the road to more than one curious discovery. This impropriety of elementary terms in the sciences, is the first twist given to human reason, which is thereby, from its very commencement, turned wholly aside from the path of nature.—See STUDY XI.

quickness of its decay, like pleasure too, bears danger around it, and repentance in its bosom.

When Naturalists attempt to explain, by uniform laws, and by the simple action of air, moisture and heat, the developement of so many plants, growing upon the same dunghill, but of different colours, forms, savours and perfumes, they lead us into still farther deviations from the course of nature. Would they analyze and decompound the principles of them? Alas! in their furnaces, poison and aliment present the same results. Nature sports with their art, as with their theory. The corn-plant, gathered in small bundles by the vulgar, answers a thousand valuable purposes, while a multitude of vegetables have remained, in the laboratories of the learned, entirely useless. I remember having read, formerly, several highly finished dissertations on the manner of employing the horse-chesnut as food for cattle. Every academy in Europe furnished, at least, a method of its own; and the result of all their learned lucubrations was, that, unless prepared by a very expensive process, it was good for nothing, and even then was useful only in the manufacturing of tapers and hair-powder. I was astonished: not that naturalists should be ignorant of its use, and should have studied it merely for the purposes of luxury; but that nature should have produced a fruit, which was of no service even to the brute creation. I was at last, however, cured of my ignorance by the brutes themselves. I happened, one day, to be taking my walk to the Bois de Boulogne, with one of these chesnuts in my hand, when I perceived a goat feeding. I approached her, and amused myself with stroking her. As soon as she perceived my chesnut, which I held between my fingers, she seized, and began instantly to chew it. The lad, who had the care of her, told me, that the goats were all fond of this fruit, and that, in the females, it contributed to the increase of their milk. At a short distance,

in the chesnut grove, which leads to the Chateau de Madrid, I saw a herd of cows diligently seeking for these chesnuds, and devouring them with an eager appetite, though unaccompanied either with sauce or pickle. Thus our learned systems conceal from us the most natural truths, with which every peasant is acquainted.

What an unsatisfactory spectacle do our cabinets of preserved animals exhibit? In vain has the art of a Daubenton been exerted to give them the appearance of life. Whatever industry may be employed to preserve the respective conformations, their stiff and motionless attitudes, their dull and inflexible eyes, their unsleek and bristly hair, all declare them to have felt the stroke of death. In this state, even beauty itself inspires horror; whereas the most homely objects are agreeable when placed in the situation assigned them by nature. In the West Indies, I have been often amused at the sight of a crab on the sand, striving with his claws to break into the shell of a large cocoa-nut; or a shaggy ape balancing himself on the top of a tree, at the extremity of a *lianne*, loaded with pods and brilliant flowers. Our books of natural history are, in reality, so many romances of nature, and our cabinets her tomb. To what a humiliating state have our speculations and our prejudices degraded her! Our treatises of agriculture exhibit, on the plains of Ceres, nothing but sacks of corn; in the meadows, the beloved haunts of the nymphs, only bundles of hay; and in the majestic forests, cords of faggots and wood. What violence has been done to her by pride and avarice! How many charming hills have been reduced to a state of villanage by our laws! How many dignified rivers degraded into servitude by imposts! The history of man has been disfigured in another way. If we except the interest, which religion or humanity have induced a few virtuous individuals to take in his favour, the rest of our historians have written under the influence of a thousand passions. The politician represents mankind as divided into nobles and

plebeians, papists and huguenots, soldiers and slaves. The moralist, again, divides them into the avaricious, the hypocritical, the debauched, and the proud; the tragic poet into tyrants and their victims; the comic into drolls and buffoons; the physician into the bilious and the phlegmatic; and they are exhibited, universally, as subjects of aversion, of hatred or of contempt. Man has every where been dissected, and now nothing is shown of him but the carcase. Thus has the very master-piece of creation suffered in the general wreck, and, like every other object in nature, been degraded by our systems and our learning.

I am far, however, from affirming, that, from such partial means no useful discovery has proceeded: but these circles, within which we would circumscribe the supreme power, instead of determining its bounds, mark only the limits of human genius. We accustom ourselves to compress our ideas into these narrow spaces, and whatever will not assort with them, we dishonestly reject. We act the part of the tyrant of Sicily, who fitted the unhappy travellers to his bed of iron: if the limbs were too long, they were cut shorter, if too short, they were as cruelly stretched to the length of his bed. We apply all the operations of nature to our pitiful methods, thereby to reduce them to a general law and a common standard: Led away by the spirit of the age, I fell myself into the same error, and gave, at the end of my Voyage to the Isle of France, a system of botany, in which I explained the developement of plants, as our naturalists explain that of the madrepores, from the mechanism of the small animals which constitute them. I mention this work, which I composed merely as an amusement, in order to prove, how easy it is to support a false principle by true observations; for, having communicated it to Rousseau, who, it is well known, was a skilful botanist, he said to me: "I cannot adopt your system, yet it would cost me six months to refute it; and even then I could not flatter myself with having succeeded in the

"attempt." Had the suffrage of this man, who was ingenuousness itself, been wholly without reserve, it would not have justified the libertinism of my mind. Fiction embellishes only the history of man, that of nature is degraded by it. Nature is herself the source of all that is useful, ingenious, lovely and beautiful. By forcibly applying to her our own inventions, or by extending to all her operations the few laws which are known to us, we draw a veil over others, and those perhaps the most admirable of all, with which we are totally unacquainted. We add to the cloud, in which she wraps her divinity, that of our own errors. They get into credit in the progress of time, by professorships, by books, by protectors, by associations, and especially by pensions; while no one is paid for investigating truths, that have only the improvement of mankind to recommend them. We carry with us, into researches so sublime and independent, the passions of the college and of the world, intolerance and envy. Those who enter first on the career, oblige those who come after them to tread in their footsteps, or to resign their pretensions: as if nature were the patrimony of such men, or her study a trade, that did not admit of every competitor. What pains did it not cost to eradicate, in France, the metaphysics of Aristotle, which had grown into a species of religion? The philosophy of Descartes, which supplanted it, might have subsisted to this day, had its revenues been equally ample. That of Newton, with its powers of attraction, is not more solidly established. I have the highest respect for the memory of these great men, whose very digressions have been instrumental in making some highways for us through the vast empire of nature: but, on more occasions than one, I shall combat their principles, and especially the applications that have been made of them, persuaded, while I renounce their systems, that I shall be promoting their intentions. It was the object of all their studies to raise men to the Deity by their sublime discoveries, without suspecting that the laws they were establishing in

physics, might one day be the means of subverting those of morality.

To form a proper judgment of the magnificent spectacle of nature, we must suffer every object to remain in its place, and must remain ourselves in that which she has assigned us. It is with a view to our happiness, that she has concealed from us the laws of her omnipotence. How could beings, feeble as we are, possibly embrace their infinite extent? But she has placed within our reach all that it is profitable or pleasant to us to know: all the emanations of her exuberant goodness. To unite mankind, by a reciprocal communication of knowledge, she has given to each individual his particular ignorance, and has placed science as a common stock to render us necessary and interesting to each other. The earth is so abundantly covered with vegetables and animals, that no naturalist, no academy, and no nation will acquire a complete vocabulary of their names; but it is to be presumed, that the human race at large may be acquainted with all their properties. In vain do your enlightened countries boast of being the repositories of every art and science: it is to savages, or else to men devoid of erudition, that we are indebted for the first observations that have given rise to them. It is neither to the polished Greeks nor Romans, but to nations which we call barbarous, that we owe the use of simples, of bread, wine, domestic animals; of cloths, dies, metals, and whatever else is useful and pleasant in human life. Modern Europe prides herself upon her discoveries: but the art of printing, which, it is said, can alone immortalize those discoveries, was found out by so obscure an individual, that many towns of Germany, of Holland, and even of China have claimed the invention as their own. Galileo would never have weighed the air, if a fountain player had not observed, that water, in the tubes of a forcing engine, never ascends to a height greater than thirty-two feet. Newton would never have perused the stars, if some children, in Zealand, playing

with the glases of a spectacle-maker, had not furnished the first idea of a telescope. The continent of America would never have been subjugated by our artillery, had not gunpowder been accidentally invented by an idle Monk: and whatever glory Spain may assume to herself from the discovery of this new world, the savages of Asia had planted empires there long before Columbus placed his foot upon the shore. What, indeed, must have been the fate of this celebrated navigator himself, had he not found, in the country, simple and well disposed inhabitants, who supplied him with the necessaries of life? Let academies, then, accumulate machines, let them multiply their systems, their books and their eulogiums: the chief praise, after all, will be due to the ignorant, for it was the ignorant who furnished them with the first materials.

It is under this title that I present my humble offering. It is the fruit of many years application, which, notwithstanding the intervention of many a tedious and tempestuous period, have passed away in these agreeable researches, like a pleasant and tranquil day of spring. I was desirous, if it should not be permitted me to reach a boundary at which I might stop, to communicate, at least, the pleasure which I had tasted on my way. I have clothed my observations in the best style of which I am capable; frequently deviating to the right hand and to the left, as my subject carried me; sometimes abandoning myself to a multitude of projects, which the infinite intelligence of nature inspires; sometimes dwelling with complacency on happier seasons and situations, which are never to return; sometimes plunging into futurity, and fixing my thoughts upon a more fortunate state of existence, of which heaven, in its kindness, affords us a glimpse, through the dark clouds of this melancholy life. Descriptions, conjectures, perceptions, views, objections, doubts, and even my very ignorances, are all heaped together in a pile; and I have

called these ruins by the name of **STUDIES**, as a painter does his sketches of an admirable picture, to which he is unable to give the finishing.

It was necessary, however, amidst this disorder, that some kind of method should be adopted, without which the confusion of matter would have increased still farther the insufficiency of the author. I have followed the most simple. I endeavour first, to refute the objections raised against Providence ; I next examine the existence of certain sentiments, common to all men, and which oblige us to acknowledge, in all the works of nature, the laws of her wisdom and goodness ; and lastly, I apply these laws to the globe, to plants, to animals, and to man.

Such is the manner in which it is my intention to direct my course. If, in the rapid sketch I am about to give of it, the reader should be tired with its dryness, I must entreat him to reflect, that this is the necessary result of every abridgment ; that, in return, I spare him the fatigue of a preface ; and that Pliny, who had a much better head than mine, has not hesitated to form the whole of the first book of his natural history, out of the mere titles of the chapters that compose it.

I, accordingly, said to myself, In the **FIRST PART** of my work I will display the blessings bestowed by nature on the age in which we live, and enumerate the objections that have been started against the providence of its author. I will not withhold a single one that I am acquainted with, and will draw them up in a body, thereby to give them the greater force. I will employ, in overthrowing them, not metaphysical reasonings, like those of which they are formed ; because, by such reasonings, no dispute has ever been terminated ; but the facts themselves of nature, which admit of no reply. With the self-same facts, I will raise, in my turn, difficulties against the principles of human science, infallible as those principles have hitherto been

deemed. I will thence proceed to the weakness of our reason ; will examine whether it is in possession of universal truths ; what we are to understand by order, beauty, correspondence, harmony, pleasure, happiness, and their contraries ; and, lastly, what is an organised being. From this examination of our faculties and the effects of nature, will result the evidence of many physical laws, constantly directed to a single end, as well as the evidence of a moral law, which respects man alone, and the sentiment of which has been universal in all ages, and among all nations. These preliminaries are absolutely necessary. Before we erect an edifice, we must always clear the ground, and lay the foundation.

In the SECOND PART, I shall apply these laws to the globe. I shall examine its form, its extent, the division of its hemispheres, and the manner in which it is composed, like every other organised work of nature, of parts similar and parts contrary. I shall, in turn, consider the elements, and the circumstances of their adaptation to each other, the fire to air, the air to water, the water to the earth. This order establishes among them a real subordination, of which the sun is the chief agent. He is not, however, the sole mover, and still less the disposer of nature. His uniform motion on the elements would, eventually, either separate, or else confound them. There are other laws which counterbalance his, and maintain the general harmony. I shall follow the admirable variety of his course, shall observe the effects of his light and heat, and how astonishingly they are diminished or multiplied in the heavens, in the inverse ratio of latitudes and seasons. I shall speak of the great reverberators of heaven, of the moon, of the aurora borealis, of the stars, and of the mysteries of night ; but so far only as the human eye is permitted to observe them, and the human heart to feel their influence. In like manner, I shall speak of the nature of

fire, not to explain it, but to evince our profound ignorance of the subject. This element, which renders all other things perceptible to man, eludes itself his most eager researches. We shall find, that there is neither animal, nor plant, nor fossil, capable, for any length of time, of subsisting in it. It is the only being in nature that increases its bulk by communicating itself. It penetrates all bodies, without being penetrated by them in its turn. It is divisible only in one dimension. It has no gravity. Though nothing attracts it to the centre of the earth, it is diffused through all its parts. Its nature differs from that of all other bodies. Its destructive and indefinable character seems to favour the opinion of Newton, who considered it only as a motion communicated to matter, and thereby reduced the number of elements to three. As, however, it is one of the four general and active principles of existence in all living beings, as we often find it in others that are in a dormant state, and as there are none, as will be seen, but what have organs or parts calculated to weaken or multiply its effects, we must acknowledge it, not only to be an element, but the first and principal agent of nature. From fire I shall pass to the air. I shall examine the quality it possesses of expanding and contracting, of heating and cooling itself; and the effects of that vast stratum of frozen air, which surrounds our globe about a league above the surface, and of which scarcely one of the phenomena has hitherto been explained. I shall consider next, the effects of water; in what manner heat evaporates and cold fixes it; its different modes of existence, that is, its volatility in the air, in clouds, in dew, and in rain; its fluidity on the earth, in rivers, and in seas; and its solidity at the poles, and on lofty mountains, in snow and in ice. I shall enquire how the seas, which are the great reservoirs of this element, are distributed with regard to the sun; how they receive from him, through the mediation of the

air, a part of their movements; in what manner they continually renew their waters, by means of the ice accumulated at the poles, the annual or periodical fusion of which furnishes them as constantly with a supply, as the fusion of ice on the summit of high mountains renews and supplies the waters of great rivers. I shall hence deduce the origin of the tides, the monsoons in the Indian Ocean, and the principal currents of the vast watery element. I shall then hazard a conjecture respecting the quantity of water which surrounds the earth, in the three states of volatility, fluidity, and solidity; and shall examine whether, if the whole were reduced to a state of fluidity, it would not be sufficient to cover the whole extent of the globe. I shall also consider in what manner all the parts of the earth, that is, of the dry land, are distributed as to the sun; so that there should be no cavity of a valley, and no point of a rock, but what, at some season of the year, are exposed to his rays, and are arranged, at the same time, in the best possible order, for increasing or mitigating his heat, by their form, and even by their colour. I shall demonstrate, notwithstanding the apparent irregularity of the different parts of the globe, that they are opposed, with so much harmony, to the different currents of air, that there is not one but what is ventilated by winds, hot, cold, dry, and humid; that the cold winds blow most constantly into warm countries, and warm winds into cold countries; that these countries, in their turn, re-act on the air, so that the cause of the winds is not to be sought, as we have hitherto supposed, in the places from which they proceed, but in those which they visit. This subject dismissed, I shall speak of the direction of the mountains, their declivities, their aspects as to seas and lakes, of which their ridges are all adapted to receive the exhalations; and lastly, of the matter which attracts and fixes these exhalations round their peaks, that act, in this respect, like so many

electrical needles. I shall next examine for what reason nature has divided the globe into two hemispheres; and what means she employs to accelerate or retard the course of rivers, and to protect their mouths against the movements and currents of the ocean. I shall treat of banks, shoals, rocks, and of isles both in seas and in rivers; and shall prove, I say it with confidence, shall prove to a demonstration, that those last, though detached from the continent, are no more ruinous fragments separated from it by violence, than bays, gulphs, and inland seas are violent eruptions of the ocean. I shall terminate this part of my plan, by indicating the principal agents employed by nature in repairing her works; how she purifies the air, so often loaded, during the heat of summer, with mephetic vapours, by fire, in the form of thunder, and the waters of great lakes and seas, by the volcanos which she has placed in their neighbourhood, at the extremity of their currents, and which she has multiplied in warm climates; how she cleanses the basons of these very waters, which, in the lapse of a few ages, would be filled up by the accumulated spoils of the earth, by means of tempests and hurricanes, which agitate them to the very foundation, and cover their banks with the wreck; and how,—having restored these wrecks to their first elements, by her fires in the air, her volcanos, and the perpetual motion of the waves, which reduce them to sand, and an impalpable powder, on the shores of the sea,—she repairs, by the instrumentality of winds and attractions, the incessant diminution of the mountains, occasioned by the rains and torrents. In a word, I shall make it appear, that, vast and lofty as are the mountains, and profound the vallies, tempestuous as are the oceans, and opposite the temperatures, which enter into the composition of this terrestrial globe, an access to all its parts has been rendered easy to a being so feeble and diminutive as man, and that this access is possible to man only.

This last view of the subject will furnish me with some curious conjectures, as to the first adventurers upon the ocean, and the earliest voyages undertaken by mankind.—Such is the prospectus of my SECOND STUDY, and, cursory as I have made it, I flatter myself, that I have said enough in it to evince, that the same intelligence, whose productions we admire in plants and animals, equally presides in the edifice which is inhabited by man. Hitherto, the earth has never been considered but as in a state of ruin, and it is this circumstance which renders geography so insipid a study: but I will venture to assert, that, after perusing my observations, trivial as they may be, the course of a rivulet on a map, will appear more agreeable than the aspect of a plant in a botanist's herbal, and the topography of a place as interesting as its landscape.

In the THIRD PART of this work I shall show, that the different parts of plants are so disposed in relation to the elements, that, far from being a necessary production of those elements, as some philosophers pretend, they are, on the contrary, almost always in opposition to their action. I shall, accordingly refer their flowers to the sun; the thickness of their barks, the skin which covers their buds, the hair, the down, the resinous substances with which they are clothed, to the absence of his beams; the pliancy or stiffness of their stems, to the different impulses of the air; their leaves, to the dews of heaven; and their roots to sands, mires, rocks, by their fibres, their pivots, and their long cordage. This last relation of plants to the earth is, in my estimation, the most important of all, though the least attended to; for there is not one, whether floating in water, or balancing itself in the air, but what is, in some way or other, attached to it; they all derive part, at least, of their nutriment from thence, and re-act, in their turn, on the earth, by their shade, which adds to its freshness, by their spoils, which contribute to fertilize it, and by

their roots, which bind together its different strata. Regardless, however, of this, I shall adhere to the exterior characters, by which nature seems to divide them into different genera. Their principal character it is difficult to determine, not only because the simplest plant unites in itself a great variety of relations to all the elements, but because nature does not place the character of her works in any one of the parts, but in their combination. We shall seek, therefore, that of each plant, in its grain, which, as being the principle, must necessarily unite every thing proper for its expansion, and determine, at least, the element in which it should grow. Those, accordingly, which have grains extremely volatile, or furnished with tufts of down, pinions, sails, &c. shall be referred to the air. They grow, in fact, in places exposed to the wind, as we may observe, in the gramineous tribes, the thistle, and the like. Those which have fins, floaters, and other instruments of swimming, shall be assigned to the water; and such are, not only the fucus, the alga, and other sea plants, but the cocoa tree, the walnut, the almond, and other vegetables, which seem to court the banks of the water. And those, again, which, by their roundness and other varieties of form, are adapted for rolling, springing, catching, and are susceptible of numerous other movements, shall be allotted to the earth, properly so called.

This reference of plants to their geography, presents us, at once, with a grand general order, of easy comprehension, and a multitude of subdivisions, which it will not be unpleasant to run over in detail. First, their genera divide themselves, like those of animals, into aerial, aquatic, and terrestrial. Then their classes are subdivided relatively to the zones, and to the degrees of latitude of each zone; such is, to the south, the class of palms, and to the north that of firs: and their species again relatively to the territory of that zone, to its plains, its mountains, its rocks, and its marshes. Accord-

ingly, in the clafs of palms, the cocoa tree of the sea-shore, the latanier on the strand, the date tree of the rocks, the palmist of the mountains, and so on, will crown the various sites of the torrid zone ; while, in that of firs, the pine, the spruce, the larch, the cedar, divide among themselves the empire of the north. This order, by placing every vegetable in its natural situation, will furnish us, beside, with the means of tracing the use of all its parts, and, I will venture to affirm, of ascertaining the reasons which have determined nature to vary their form, and to create so many species of the same genus, and so many varieties of the same species, by discovering to us their admirable correspondence, in every latitude, with the sun, the winds, the water, and the earth. We may perceive, upon this plan, the light which geography may diffuse over the study of botany ; and how botany, in its turn, may illuminate geography : for, supposing botanical charts were to be formed, in which, by colours and signs, should be represented, in each particular country, the reign of each vegetable produced there, by determining its center and limits, we should at once have a view of the fecundity proper to each district of that country. This knowledge would supply very ample means of rural economy, as we might substitute for the indigenous plants which were most common there, and most vigorous, such of our domestic plants as are of the same species, and which would infallibly succeed. Beside, these different clafses of vegetables would furnish us, by such an arrangement, with the degrees of humidity, dryness, cold, heat, and elevation of each district, and that too with a precision which our barometers, thermometers, and other physical apparatus can never attain. I omit a multitude of other relations, productive both of pleasure and utility, which would result from such clasification, but which I shall endeavour to unfold in their proper place.

In the **FOURTH PART**, which treats of animals, I shall pursue the same track. I shall illustrate, first, their relations to the elements. Beginning with the element fire, I shall consider the connexion which they have with the great luminary, which is the source of it, by their eyes, furnished with lids and lashes to moderate the lustre of his light ; by the state of torpidity into which the greater part of them fall, when he is no longer above the horizon ; and by the colour of their skin, and the thickness of their furs, corresponding to their distance from him. I shall then trace their relations with the air, by their attitude, their weight, their lightness, and the organs of respiration ; to the water, by the various curves of their bodies, by the unctuousness of their hair and plumage, by their scales and their fins ; and, lastly, to the earth, by the form of their feet, sometimes forked, or armed with prongs and claws, adapted to a hard soil, sometimes broad, or furnished with a hide, suited to a yielding one, and by other means of progression, which nature has varied according to the obstacles which they have to surmount. And here we shall observe, as in the case of plants, that so many different configurations, so far from being the mechanical effects, in animals, of the action of the elements in which they live, are, on the contrary, almost always in the inverse ratio of these causes. Thus, for example, a great many fishes are cased in rough and hard shells, in the bosom of the waters, and many animals, the inhabitants of the rocks, clothed with the softest furs. We shall, therefore, divide animals, as we divided vegetables, by referring their genus to the elements, their classes to the zones, and their species to the different districts of each zone. This arrangement puts, at once, every animal in its natural place ; but we shall establish him there in a still more precise and interesting manner, by referring his species to that of the plant which the district produces in greatest abundance.

Nature herself indicates this order. She has adapted to plants, the smelling, the mouths, the lips, the tongues, the jaws, the teeth, the beaks, the stomach, the chylication, the consequent secretions, and, in a word, the appetite and instinct of animals. It cannot, indeed, be said, that every species of animal lives on a single species of plant; but we may easily convince ourselves, by experiment, that each prefers some one in particular to every other species, when left to an entire liberty of choice. This preference is especially remarkable at the season when the production of their young engages their attention, and they are then determined in favour of the plant, which, in perfect conformity to their situation, provides them, at once, with nutriment, bedding, and protection. Thus the goldfinch is attached to the thistle, and hence, in the French language, is called by the name of this plant, because he finds a rampart in its prickly leaves, food in its seeds, and in its down materials for his nest. The humming-bird, of Florida, for similar reasons, prefers the bignonia, which is a creeping plant that finds its way to the tops of the highest trees, and frequently covers the whole trunk. He builds his nest in one of its leaves, which he rolls into the form of a hood;* he finds his food in its red flowers, resembling those of the foxglove, the nectarious glands of which he employs himself in sucking: he plunges into the flower his little body, which appears, in the heart of it, like an emerald set in choral; and he sometimes penetrates so far, that he suffers himself to be surprised there, and caught. It is in the nests, then, of animals, that we shall look for their character, as we sought that of plants in the grains of those plants. It is from their nests we shall determine the element in which they ought to live, the proper site of their habitation, the aliment best adapted to their constitution, and the first lessons of in-

* Buffon says in the shape of a half cup. See Smellie's Abridgment, vol. vi. p. 6.

dust, of love, or of ferocity, which they receive from their parents. The plan of their life is contained in their cradles. Strange as these indications may appear, they are, nevertheless, those of nature, who seems to tell us, that we may distinguish the character of her children, like that of herself, in the fruits of love, and in the care which they take of their posterity. She often lodges under the same roof both vegetable and animal life, and unites the destiny of one to that of the other. We see them bursting together from the same shell, opening, expanding, propagating, dying, in a similar progression. They exhibit, if I may so speak, at the same instant of time, the same metamorphoses. While the plant unfolds, in succession, its germs, its flowers, its fruits, the insect, on one of its leaves, is displaying in similar order, the egg, the worm, the nymph, the butterfly, which contains, like its parents, the seeds of its posterity, together with those of the plant which has nourished it. It is thus that fable, far below nature in the marvellous, inclosed within the bark of the oak the life of the Dryads. These relations are so striking, in insects, that naturalists themselves, notwithstanding their prodigious number of classes, standing apart, as it were, by themselves, and with no determination, have characterized some of them by the name of the plant on which they live: such are the caterpillar of the tithymule, and the silk-worm of the mulberry. In my opinion, there is not a single animal which deviates from this plan, not excepting even such as are carnivorous. Though the existence of these last appears, in a manner to be grafted on that of the living species, there is not one of them that does not make use of some species of vegetable. This is observable, not only in dogs, which sometimes eat of the grass that is called by their name, and in wolves, foxes, and birds of prey, which, in like manner, feed occasionally on the plants, bearing, for the same reason, their respective denominations, but even in fishes of the

sea, which are entire strangers to our element. They are first attracted to the banks by insects, whose spoils they devour, which establishes, between them and vegetables, intermediate relations; afterwards by the plants themselves, for most of them come to spawn on our coasts only when certain plants are in flower or in fruit. Destroy these plants, and they visit us no longer. Denis, governor of Canada, relates, in his Natural History of North America,* that the cod, which used to frequent, in shoals, the coasts of the island of Miscou, in 1669 entirely disappeared, because, in the preceding year, the forests had all been consumed by a conflagration. He remarks, that the same effect had been produced by the same cause in other places. The disappearance of these fishes he ascribes to the particular effects of fire; but this opinion, though he is a writer of great intelligence upon subjects in general, I shall venture to question, and shall prove, by other curious observations, that it must have been occasioned by the destruction of the vegetables which attracted them to the shore. Thus all things in nature are allied together. The Fauns, the Dryads, and the Nereids walk, everywhere, hand in hand. What a charming spectacle would a botanical zoology present? What unknown harmonies would be reflected from a plant to an animal, and from an animal to a plant? How many picturesque beauties would appear? How many relations, of every kind, contributing both to our pleasure and profit, would be the result? The introduction of a single new plant in our fields, would be sufficient to allure a new set of songsters to our groves, and shoals of unknown fishes to the mouths of our rivers. Would it not be possible, even, to increase the family of our domestic animals, and people the glaciers of the lofty mountains of Dauphiny and Auvergne with herds of rein-deer, an animal so valu-

* Vol. ii. ch. 22. page 350.

able in the north of Europe ? or with the lama of Peru, that delights in the snows at the foot of the Andes, and that nature has clothed in the finest wool ? A little moss, or a few rushes, of their own country, would be enough to fix them in ours. Attempts, indeed, have frequently been made to propagate the breed of foreign animals in our parks, by chusing those species whose native climate assimilated the nearest to ours : but they have all languished and died, because no care was taken to transplant with them their proper vegetables. We have found them always restless, feebly hanging down their heads, or else scratching up the ground, as if demanding from the earth the nourishment they had lost. A single herb would have quieted and consoled them, by recalling the tastes of their early life, the breezes which used to fan them, the fountains and refreshing shades of their true country. Meanwhile, they are less unhappy than men, who can be cured of such regrets only by the total loss of memory.

In the FIFTH PART, we shall speak of man. Hitherto, every work of nature has presented us only with partial relations ; man will furnish us with such as are universal. We shall examine first, those in which he stands to the elements. Beginning with the element of light and heat, we shall observe, that his eyes are turned, not towards heaven, as poets, and even some philosophers allege, but to the horizon, that he may view at once, the heaven that enlightens, and the earth that supports him. His visual rays embrace nearly half the celestial hemisphere and of the plane on which he stands, and their reach extends from the grain of sand, which he tramples under foot, to the star, which shines over his head, at a distance too great to be measured. Of all animals he alone can enjoy equally the day and the night ; he alone can live within the heat of the torrid zone, and upon the ice of the frigid. If certain animals share with him in these advantages, it is by his

instructions and under his protection. For this prerogative he is indebted to the element of fire, of which he alone is the sovereign. Some writers pretend that other animals understand its management, and that the monkeys in America keep up the fires kindled by travellers, in the forests. They doubtless love its heat, and resort to it to warm themselves, when they perceive that its master has retired from it. But, as they have felt its cheering influence, how is it, if they understand its management, that they have not preserved the use of it? Simple as may be the manner of keeping up a fire, by merely adding fuel to it, not one of them will ever attain even to this degree of sagacity. The dog, an animal much more intelligent, who is a daily witness of the effects of fire, and accustomed, in our kitchens, to live only on meat that has been dressed, if you give him a piece of raw flesh, does he ever dream of going to roast it on the coals? Feeble as this barrier may appear, which separates man from the brute creation, no creature beside is capable of surmounting it. It is so ordained by the kindness of providence for the general security: for how many unforeseen and irreparable conflagrations would take place, if it were at the disposal of animals? Fire is the first agent of nature, and God has entrusted it to that being who is alone qualified, by his reason, to make a right use of it.

While some historians bestow the knowledge of this element on brutes, there are others who deny it even to men. They tell us, that many nations were entirely destitute of it till the arrival of Europeans among them. To prove this, they cite the inhabitants of the Marianne Islands, otherwise, called by a calumnious imputation, common among sailors, the Isle of Thieves. But they found their assertion upon mere supposition, that is, upon the astonishment expressed by these islanders, which was surely very natural, when they saw their villages set on fire by

the Spaniards,* whom they had received with kindness: and at the same time they contradict themselves in two flagrant instances, first, by relating, that these people made use of canoes, daubed over with bitumen, which supposes, in savages, unacquainted with iron, that fire had been employed in hollowing, or, at least, in careening them; and next, by informing us that they fed on rice, the preparing of which, however simple, necessarily requires the use of fire. This element is every where indispensable to the existence of man, not excepting even the warmest climates. It is by means of fire alone, that he guards his habitation, by night, from ravenous beasts of prey; that he drives away the insects which thirst for his blood; that he clears the soil of the trees and plants which cover it, whose stems and trunks would stand in the way of every species of cultivation, though he should contrive, by any other method, to bring them to the ground. In a word, it is with fire, that, in every country, he prepares his food, that he dissolves metals, vitrifies rocks, hardens clay, softens iron, and gives to all the productions of the earth, the forms and combinations which his necessities require.

The benefits which he derives from the air are equally extensive. There are few animals, who, like him, can respire, with equal ease, on the level of the sea, and on the summit of the loftiest mountains. He is the only being who gives to respiration all the modulations of which it is susceptible. With his voice alone, he imitates the hissing, the cries, and the melody of all animals, while he enjoys the gift of speech, denied to every other. He sometimes communicates sensibility to the air: he makes it sigh in the pipe, lament in the flute, threaten in the trumpet, and animate to the tone of his passions, brass, the box tree, and

* See the Account of their Discovery, by Magellan; the History of the Marianne Isles, by Father Gobian, Vol. II. page 44; and that of the West Indies, by Herrera, Vol. III. page 10, & 712.

the reed. Sometimes he makes it his slave : he forces it to grind, to bruise, and to move, for his advantage, an endless variety of machines. In a word, he harnesses it to his car, and obliges it to waft him over the stormy billows of the ocean.

This element too, in which the greater part of the inhabitants of the globe are incapable of existing, and which separates their different classes, by a barrier, still more insurmountable than that of climate, offers to man, and to man alone, the earliest communication. He swims, he dives in it, he pursues the sea monsters to their abysses, he strikes the whale, under mountains of ice, and he visits every island in its bosom, to assert his empire over the deep.

But he had no need of the prerogative which he exercises over the air and the waters, to render his sovereignty universal. He might have been satisfied with remaining on the earth, where he was born. Nature has placed his throne on his very cradle. Every thing that lives, comes thither to pay him homage. There is not a vegetable but what fixes its roots to it, not a bird but builds his nest there, nor a fish but deposits there its spawn. Whatever irregularity may appear on the surface of his domain, he is the only being formed with the capacity of pervading all its parts : and what, in this respect, must excite our admiration, there is established, among all his limbs, so perfect an equilibrium, so difficult too to be preserved, so contrary to the laws of our mechanism, that there is no sculptor who can form a statue resembling man, broader and heavier above than below, which shall be able to maintain an erect position, and remain immoveable, on a basis so small as his feet. Made upon this principle, the slightest wind would quickly overset it. What skill then would be requisite to make it move like man ? There is no creature whose body is susceptible of so many different motions ; and I am tempted to believe, that he unites in himself all the poizable varieties

of which animals are capable, when I see how he bends, kneels, creeps, slides, swims, forms himself into an arch, rounds himself, now like a wheel, now like a bowl, walks, runs, leaps, springs, mounts, descends, climbs; in a word, how his frame is equally adapted to clamber to the summit of the rock, and to walk on the surface of the snow; to traverse the river and the forest, to pick the morsels of the fountain, and gather the fruit of the palm tree; to feed the bee, and to tame the elephant.

With all these advantages, nature has collected in the human figure every thing that is lovely in colour and form, whether resulting from harmony or from contrast. To these she has added movements the most majestic and graceful. It was from an accurate observation of this quality, that Virgil was enabled to finish, by so masterly a stroke, the portrait of Venus disguised, talking with Eneas, who, though she was so exquisite in beauty, failed to detect her; but she no sooner moved, than she was revealed to his eyes: *Vera incessu patuit dea*; "Her graceful step declared the goddess." The author of nature has united in man every species of beauty, and has formed of these so wonderful a combination, that all animals, in a state of nature, are struck, on beholding him, either with love, or with terror: this we shall demonstrate by more than one curious observation. And, thus, is accomplished the word, which conferred on him at the creation, the sovereignty of the world: "and the fear of you, and the dread of you shall be upon every beast of the earth, and upon every fowl of the air, upon all that moveth upon the earth, and upon all the fishes of the sea: into your hand are they delivered."*

As he is the only being who has the disposal of fire, which is the principle of life, so is he the only one that practices agriculture, which is its support. All frugivorous animals have, like himself, occasion for this art, most of

* Genesis, chap. ix. v. 2.

them the experience, but none of them the practice. The ox never thinks of resowing the grain which he treads out with his hoof on the floor of the barn, nor the monkey, the maize of the field which he plunders. We are often presented with far-fetched theories of the relations which may subsist between brutes and man, with a view of reducing him to their level ; while the trivial differences which are continually before our eyes, and interpose between us and them, an immeasurable interval, are overlooked, and these are the more wonderful, the more easy it appears to surmount them. Every individual of the brute creation is circumscribed within a narrow sphere of vegetables, and the means necessary to gather them. Not one extends his industry beyond his instinct, be his wants what they may. Man, alone, is capable of raising his intelligence to the intelligence of nature. He sometimes pursues her plans, sometimes recedes from them, and sometimes substitutes others in their place. He covers regions destined for forests with corn and wine. He says to the pine of Virginia, and to the chesnut of India, You shall grow in Europe. Nature seconds his efforts, and seems, by her complaisance, to invite him to prescribe laws to her. For him she has covered the earth with plants, and, though their species be infinite in number, there is not one but may be converted to his use. She has, first, selected some out of every class to minister to his pleasure, or his support, wherever he shall please to fix his habitation : from the ferns of the Moluccas, the sago ; from the palm-groves of Arabia, the date ; from the reeds of Asia, the sugar cane ; from the solanums of America, the yam ; from the lianne tribe, the vine ; from the papilionaceous, the french-bean, and the pea ; while the potatoe, the manioc, the maize, and an innumerable multitude of fruits, grains, and roots, proper for food, are distributed for him, in every family of vegetables, and over every latitude of the globe. She has per-

mitted the plants which are most useful to him to grow in all climates. The domestic plants, from the cabbage to that of corn, are the only ones, like himself, that are citizens of the world. Others serve for his bed, for his roof, for his clothing, for the cure of his diseases, and for the fire of his hearth. And that all might contribute to his support, and that the distance, or ruggedness of the soil in which they grow might interpose no obstacle to his enjoyment of them, nature has formed certain animals to seek them out for him, and to convert them to his use. These animals are formed in the most wonderful manner, to live at once in situations the most rugged, and animated, by an instinct the most tractable, to associate with man. The lama of Peru, with his forked feet and armed with two spurs, scrambles over the precipices of the Andes, and brings back to him his rose-coloured fleece. The rein-deer, with her broad and cloven hoof, traverses the snow of the north, and distends for him her dugs with cream in the mossy pastures. The ass, the camel, the elephant, the rhinoceros, are detached, on his service, to the rocks, the sands, the mountains, and the morasses of the torrid zone. Every region is supporting a race of servants for him ; the roughest countries a race the most robust ; penurious countries, a race the most patient ; while those animals, in which are united the greatest number of abilities, live, as it were, domesticated with him over the whole face of the earth. The sluggish cow pastures in the cavity of the valley, the bounding sheep on the declivity of the hill. The scrambling goat brouzes among the shrubs of the rock ; the hog, armed with a snout, turns up the foundation of the marshes, aided with an appendage of spurs, which nature has planted above his heels, to prevent his sinking into the soil ; the swimming duck feeds on the water-plants of the river ; the hen, with attentive eye, picks up every grain that is scattered about and lost in the field ; the pigeon, on rapid wing, collects a

similar tribute from the refuse of the grove ; and the frugal bee, turns to account even the small dust on the flower. There is no corner of the earth where the whole vegetable crop may not be reaped. Those plants which are rejected by one, are a delicacy to another, and even among the finny tribes contribute to their fatness. The hog devours the horse-tail and hen-bane ; the goat the thistle and hemlock. All return, in the evening, to the habitation of man, with murmurs, with bleatings, with cries of joy, bringing back to him the delicious tribute of innumerable plants, transformed, by a process the most inconceivable, into honey, milk, butter, eggs, and cream.

Man subjects to his dominion, not only the whole vegetable, but the whole animal creation, though the smallness of its objects, their swiftness, their strength, their cunning, and the very elements of nature, would seem to exempt them from his jurisdiction. To begin with the infinite legions of insects, his duck and his hen feed upon them. These fowls swallow even venomous reptiles, without sustaining the slightest injury. The dog subdues for him every other species of brute. The numerous varieties of this animal are evidently adapted to their several uses and ends ; the shepherd's dog, for the wolf ; the terrier, for the fox ; the greyhound, for animals of the plain ; the mastiff, for those of the mountain ; the pointer, for birds ; the water-spaniel for the amphibious race ; in a word, their species are so varied, in form, in size, in instinct, from the petty lap-dog, of Malta, serving only for amusement, to the mighty hunter of the Indies, which, according to Pliny and Plutarch, scorns to attack any thing inferior to the lion or the elephant, and whose breed still subsists among the Tartars, that I am disposed to believe, nature has produced as many sorts of dogs, as she has furnished animal species to be subjugated. We cross the breed of cats, goats, sheep, horses, a thousand different ways ; but, after all our efforts and

combinations, we are able to produce only a few trivial varieties, in no respect to be compared with the numerous and natural varieties of the canine species.

While some philosophers assign to every species of the dog a common origin, others ascribe to man a difference of origin. Their system is founded on the variety of size and colour in the human species. But neither colour nor stature, are distinguishing characters, in the judgment of naturalists in general. Colour, according to them, is merely accidental, and superior stature only a greater expansion of form. Difference of species arises from the difference of proportions. Now dogs are characterized in this manner; but the proportions of the human body never vary. The black colour of man, within the tropics, is simply the effect of the heat of the sun, which tinges him in proportion as he approaches the line. And this, as we shall see, is one of the blessings of nature. His size is invariably the same, in every age and in all places, notwithstanding the influence of food and climate, by which other animals are so powerfully affected. There are breeds of horses and of black cattle, double the size the one of the other, as may be seen by comparing the large artillery horses of Holstein, with the small ponies of Sardinia, no taller than sheep; and the huge ox of Flanders, with the diminutive one of Bengal. But from the tallest to the shortest of the human race, there is not, at most, the difference of a foot. Their stature is the same now it was in the time of the Egyptians, and the same at Archangel as in Africa, as is evident from the size of mummies, and from the tombs of the ancient Indians, found in Siberia, along the banks of the river Petzora. The stature of the Laplanders, which is rather contracted, arises, in my opinion, from their sedentary life; for I have observed, among ourselves, a similar contraction of size, in persons of certain occupations, which require little exercise. That of the Patagonians, on the contrary, is more expanded than that of the Laplanders, though

they inhabit as cold a latitude, from their greater disposition to motion and activity. The Laplander is shut up, for the greater part of the year, in a state of indolence amidst his herds of rein-deer; whereas the Patagonian is perpetually rambling, living as he does by hunting and fishing. Beside, the first travellers to whom we are indebted for our knowledge of those Nations, have exaggerated the diminutiveness of the one, and the bulk of the other, because they saw the former squatted on the floor of their smoaky huts, and the latter in a position which magnifies every object, that is to say, at a distance, on the summit of their rocky shores, whither they instantly flock as soon as a vessel is in sight, and through the fogs, which are so frequent in their climates, and which, it is well known, greatly increase the apparent size of all bodies, especially when in the horizon, by refracting the light with which they are surrounded. The Swedes and Norwegians, who inhabit similar latitudes, in which the cold prevents, as it is said, the expansion of the human body, are of the same stature with the natives of Senegal, where the heat, for the opposite reason, ought to favour their growth; and neither the one nation nor the other is taller than we are. Man, over the whole globe, is at the center of all magnitudes, of all movements, and of all harmonies. His stature, his limbs, his organs, have proportions so true to all the works of nature, that she has rendered them invariable as their combination. He constitutes, in himself alone, a genus, which has neither class nor species, and which is dignified, from its pre-eminence, with the title of mankind. He forms a real family, all the members of which are scattered over the earth to collect its productions, and are capable of maintaining a correspondence, admirably adapted to their mutual necessities. Mankind have been united in every age, not merely by the interests of commerce, but by the more sacred and indissoluble bands of humanity. Sages appeared in the east two or three thousand years ago, and their wisdom is now illuminating us at the

remotest verge of the west. To-day, a savage is oppressed in the wilds of America; he sends his arrow from family to family, from nation to nation, and the flame of war is kindled in the four quarters of the globe. We are all bondsmen for each other. We shall often recur to this sublime truth, which is the basis of the morality of subjects as well as of sovereigns. The happiness of every individual is attached to the happiness of mankind. He is bound to exert himself for the general good, because his own depends upon it. But interest is not the only motive which renders virtue a duty to him; he owes to nature its sublimest lessons. Born as he is, destitute of instinct, he was under the necessity of forming his intellect on her productions. He could imagine nothing but after the models of every kind with which she had presented him. He was instructed in the mechanic arts, by methods suggested by the industry of animals; and in the liberal sciences, by nature's own harmonies and plans. To her sublime studies he is indebted for a species of light which illuminates no other animal. Instinct discovers to the brute his necessities only; but man has raised himself from the womb of profound ignorance, to the knowledge of a God. This knowledge has not been confined to a Socrates, or a Plato; but is the lot, in common, of Tartars, Indians, Savages, Negroes, Laplanders, men of every description and clime. It is the result of every contemplation, whatever be the object of it, a tuft of moss, or the sun. It is the basis upon which are founded all the associations of the human race, without a single exception. As man has formed his intelligence on the intelligence of nature, so has he sought to regulate his moral sense by the morality of her author. He felt, that, to please him who is the principle of all good, it was necessary to contribute to the general good; and hence the efforts made by man, in every age, to raise himself to God, by the practice of virtue. This religious character, which distinguishes him from every other sensible being, belongs to his heart

rather than to his understanding. It is not so much an illumination, as a feeling, for it appears independent even of the spectacle of nature, and manifests itself, with equal energy, in those who live most remote from it, as in those who are continually enjoying it. The sensations of infinity, universality, glory, and immortality, which result from it, are incessantly agitating alike the inhabitants of the city, as those of the country. Man, feeble, miserable, mortal man, indulges himself, everywhere, in these celestial passions. Thither, are directed, without his perceiving it, his hopes, his fears, his pleasures, his pains, his loves; and he passes his life in pursuing, or combating, these fugitive impressions of Deity.

Such is the career which I have prescribed to myself. But as, in a long voyage, we sometimes perceive as we go, flowery isles, in the bosom of a great river, and enchanting groves on the summit of inaccessible precipices; so the progress we shall make in the study of nature, will ever be disclosing to us some delightful prospect. With these we shall feast the eye as we pass, if we are not permitted to contemplate them at leisure: and we shall everywhere remark, that the works of nature exhibit contrasts, harmonies, and transitions, which wonderfully unite their different empires to each other.

We shall examine, by what magic it is, that these contrasts are productive, at once, of pleasure and pain, of friendship and hatred, of existence and destruction. From them proceeds that great principle of affection, which divides all the individuals into two great classes, objects loving, and objects beloved. This principle extends from animals and plants which have sexes, to insensible fossils, as metals, which have magnetic powers, most of which are still unknown to us; and from salts, which strive to unite in the fluids where they swim, to the globes, which have a mutual attraction in the heavens. It opposes individual to

individual, by difference of sex, and genus to genus, by difference of forms, in order to extract from them innumerable harmonies. In the elements, light is opposed to darkness, heat to cold, earth to water, and their concert produces days, temperatures, and views, the most agreeable. In vegetables, we shall see, in the forests of the north, the thick and gloomy foliage, tranquil attitude, and pyramidal form of the fir, contrast with the tender verdure and trembling leaves of the birch, which, from its spreading top and slender base, presents the appearance of a pyramid inverted. The forests of the south will exhibit similar harmonies, and we shall find them even in the herbage of our meadows. The same oppositions prevail in the animal kingdom; and, to instance in those only which are familiar to us, the bee and the butterfly, the hen and the duck, the indigenous sparrow and itinerant swallow, the nimble courser and sluggish ox, the patient ass and the capricious goat, in a word, the cat and the dog, display, in our gardens, our fields, and our houses, an endless contrast of forms, of movements, and of instincts.

I do not comprehend in these harmonic oppositions, the carnivorous species making war on other species; for there the corresponding intercourse regards the objects, not as living, but as dead. I understand by contrast, that which nature has established between two classes, different in manners, in inclinations, and in figures; and to which, nevertheless, she has given certain secret affinities, which dispose them, in their natural state, to inhabit the same places, to associate together, and to live in peace. Such is the contrast of the horse, who delights to try his speed and wanton in the same meadow, where the ox stalks gravely on, ruminating as he goes. Such, again, is that of the ass, who takes a seeming pleasure in following, with a slow and measured pace, the nimble-footed goat, to the very precipices over which she scrambles. From the bee and the butterfly,

to the camelopard and the elephant, there is not an animal on the earth, but what has its contrast, man only excepted.

The contrasts of man are all within himself. Two opposite passions, love and ambition, balance all his actions. To love, are referable all the pleasures of the senses; to ambition, all the pleasures of the soul. These two passions are in perpetual counterpoise in the same individual; and while the first is accumulating on man every kind of corporeal enjoyment, and insensibly sinking him below the level of the beasts, the second leads him to aspire to universal dominion, and to exalt himself, at length, above the Deity. These contradictory effects are observable in all human beings, and every man is able, without obstruction, to resign himself to their opposite impulses, whether he exists in the class of kings, or that of slaves. The Neroes, the Caligulas, the Domitians, lived like brutes, and exacted the adoration due to gods. We find in negroes, the same incontinence, the same pride, and the same stupidity.

Nature, however, has bestowed these two passions on man, for the promotion of his happiness. She creates an equal number of each sex, in order to direct the love of each individual man to a single object, and in that object she has united all the harmonies which are scattered over her most beautiful productions. There exists between man and woman a wonderful analogy of forms, of inclinations, and of tastes; but the difference observable in these qualities is still greater. Love, as we shall have occasion to observe, results entirely from contrasts, and the greater are the contrasts, the more powerful is its energy. I could easily demonstrate this, by a thousand historical facts. It is well known, for example, with what a mad excess of passion that robust and unwieldy soldier, Mark Anthony, loved, and was beloved by Cleopatra; not the Cleopatra that our sculptors represent, of a tall, majestic, Sabine figure, but the Cleopatra described by historians, a little,

vivacious, sprightly wanton, carried in disguise, about the streets of Alexandria, in the night, and packed up in a parcel of goods, on the shoulders of Appollodorus, to keep an assignation with Julius Cæsar.

The influence of contrasts is so certain, in love, that, it would be possible, on seeing the lover, to draw the portrait of the object beloved, without having seen it, provided it were previously known that the passion was violent. I have myself made the trial, on various occasions, and have succeeded;—and once, I remember, in a town where I was entirely a stranger. A gentleman, of the place, one of my friends, carried me to visit his sister, a very virtuous young lady, and he informed me, as we were going, that she was violently in love. Arrived at her house, and love happening to be the subject of conversation, it came into my head to say to her, that I knew the laws which determined our choice in this important business, and that, if she would permit me, I would draw her lover's picture, though he was utterly unknown to me. She bid me defiance; upon which, taking the reverse of her tall and buxom figure, of her temperament and character, which her brother had been describing to me, I painted her favourite as a little man, not overloaded with flesh, with blue eyes, and fair hair, somewhat fickle in his disposition, and eager after knowledge. Every word I uttered crimsoned her cheeks with blushes, and she became seriously angry with her brother, accusing him of having betrayed her secret. This, however, was not the case, and, in reality, he was as much astonished as herself. These observations are of more importance than we generally imagine. They will enable us to demonstrate, to what a degree our institutions deviate from the laws of nature, and weaken the power of love, when they assign to woman the studies and employments of man. Virtue, alone, knows how to turn these contrasts to account in the

married state, in which the duties of the two sexes are so very different. There, too, she presents to their natural ambition, a career the most sublime, in the education of their children, whose reason it is their duty to form, and their sweetest recompence to receive, in exchange, the first sentiments of filial affection. It is in the hearts of their children, their memory is to be perpetuated on the earth, and that in a manner more affecting, and more indelible, than is the memory of kings by public monuments. What power can equal that which confers at once existence and thought; and what recollection can last as long as the transmitted sentiment of filial gratitude? The government of a good king has been compared to that of a father; but the empire of a virtuous father can be compared only to that of God himself. Virtue is, to man, the true law of nature. It is the harmony of all harmonies. It can do what nothing else can do, render love sublime, and ambition beneficent. It derives the purest gratification even from privations the most severe. Deprive it of love, friendship, honour, the sun, the elements, it still feels that, under the administration of a being just and good, other compensations are reserved for it, and it acquires an increase of confidence in God, even from the cruelty and injustice of man. It was virtue that supported, in every situation of life, an Antoninus, a Socrates, an Epictetus, a Fenelon, and that rendered them at once, the happiest, and the most respectable of mankind.

If, on the one hand, nature has established contrasts, in all her works, on the other she has deduced from them harmonies which re-unite them again. It would seem that, having fixed upon a model, it was her intention, that all places should partake of its beauty. The light and disk of the sun are, accordingly, reflected a thousand different ways, by the planets in the heavens, by the parheliions and rainbow in the clouds, by the aurora-borealis in the ices

of the north ; in a word, by the refractions of the atmosphere, the reflexes of the waters, and the specular reflexions of most other bodies on the earth. The islands in the midst of the ocean, represent the mountainous forms of the continent ; and the Mediterranean seas and lakes in the bosom of mountains, represent the vast plains of the deep.

Trees, in the climate of India, affect the port of herbs ; and the herbs in our gardens, that of trees. A multitude of flowers seem modelled after the rose and the lilly. Among our domestic animals, the cat appears to be formed on the plan of the tyger, the dog on that of the wolf, the sheep on that of the camel. Every species has its corresponding species, mankind only excepted. That of the monkey, which some would make a variety of the human race, has relations, much more direct, to other animals. The man of the woods, with his long arms, his meagre feet, his fleshless paws, his flattened nose, his lipless mouth, his round eyes, his abominable hairy coat, has, surely, a very imperfect resemblance to the Apollo of the Vatican ; and, however inclined we may be thus to degrade humanity, it would be difficult to find, in the female of that animal, a second model of the human figure, which should at all compare with the Venus de Medicis, or the Diana of Allegrain, which is shown at Lucienne. But I have seen monkeys which had a strong resemblance to the bear, as the bavian of the Cape of Good Hope ; and to the greyhound, as the maki of Madagascar. Some are found like little lions ; such is a very handsome white species, with a mane, found in Brazil. I presume, that most species of quadrupeds, especially among the ferocious kind, have their counterparts in those of the monkey tribe. Similar correspondencies are observable in the numerous varieties of parrots, which, in their forms, their bills, their claws, their scream, and their sports, imitate, in general, birds of prey. They extend even to plants, of which there are some called,

for this reason, *mimosas*, which represent in their flowers, or in the aggregation of their grains, insects and reptiles, as snails, flies, caterpillars, lizards, scorpions, &c. Nature, in these correspondencies, has some hidden design, which I cannot comprehend. It is remarkable, that they are common only between the tropics, where the forests swarm with every species of the monkey and parrot. Perhaps it was her intention to exhibit, under harmless forms, those of the noxious animals, which are found in such climates, in great abundance, in order to expose to the light of day, the terrible figure of those sons of darkness and carnage, and that none of her productions should remain concealed from the eyes of man. Be this, however, as it may, there is no animal that exists formed on the noble proportions of the human figure; and if man, under the impulse of his passions, frequently degrades himself to the level of the beasts, his restlessness, his intelligence, and his sublime affections, sufficiently demonstrate that he is, in reality, the counterpart of the Deity.

Finally, the spheres of all beings have a communication, by means of rays, which seem to unite their extremities. We shall remark the stalactities in and crystallizations of fossils, and processes of vegetation; and, I think, we may perceive, even the movement of animals in that of their magnetic influence. On the other hand, we shall see plants forming themselves, after the manner of fossils, without any apparent organization; such, among others, is the truffle, which has neither leaves, nor flowers, nor roots. Others, represent in their flowers the figure of animals, as the orchites; others, their sensibility, as the sensitive plant, which droops and closes its leaves at the slightest touch; others, their instinct, as the *dionæa muscipula*, which catches flies. The petals of this plant are formed of opposite little leaves, impregnated with a sugary substance, which attracts the flies; but, the instant they

alight, the leaves suddenly close with a spring, like the jaws of a fox-trap, and pierce the fly with their prickly edges. There are others still more astonishing, as having, within themselves, the principles of motion, such is the *bedysarum movens*, or *burum chandali*, imported, some years ago, from Bengal into England. This plant moves, alternately, the two pendent lobes, which are attached to its leaves, though no exterior or apparent cause contributes to this species of oscilation. But, without going so far in quest of wonders, we shall find, perhaps, in our common gardens, appearances of nature still more surprising. We shall see the pea, for example, pushing out its tendrils, precisely at the height where it begins to stand in need of support, and curling them round the boughs, with an address, which can hardly be ascribed to chance. These relations seem to suppose intelligence; but we shall find others still more amiable, and which exhibit proofs of goodness, not in the vegetable, but in the hand which formed it. The *sylphium*, of our gardens, is a large ferulaceous plant, which resembles, at the first glance, what is known by the name of the sunflower. Its capacious leaves are opposed at the base, and their cavities uniting, form an oval cup, in which the rain water collects, to the quantity of a tolerably large glass full. They are placed in stories, not in the same direction, but at right angles, in order to receive the rain, that falls in the whole extent of their circumference. Its square stem is very commodious for the birds to lay hold of with their claws; and its flowers produce seeds, of which many of them are excessively fond, particularly the thrush. And thus the plant, in reality, like the perch of a parrot-cage, presents, at once, to the birds, a resting place, and meat and drink.

We shall also speak of the smell and taste of plants. We shall remark, under these relations, a great number of botanical characters, which are not the least certain. It

was from the smell and taste that man acquired the first knowledge of their poisonous, medicinal, or nutritive qualities. Nay, the very voice of plants is not to be overlooked; for, when agitated by the winds, most of them emit sounds peculiar to themselves, and which produce, with the sites of the places where they usually grow, harmonies or contrasts the most agreeable. In India, the hollow canes of the bamboo, which shade the banks of rivers, imitate, as they rustle against each other, the gushing noise occasioned by the motion of a ship as it passes through the water; and the pods of the cinnamon, agitated by the winds on the mountain's top, the clacking of a mill. The leaves of the poplar, always in motion, convey to our ears, in the wood, the babbling of a brook. The green meadows and the tranquil forests, fanned by the zephyrs, resemble in the hollow valley, and on the declivity of the rocks, the undulations and murmurs of the waves of the sea breaking on the shore. The early inhabitants of the globe, struck with these mysterious sounds, imagined that they heard oracles pronounced from the trunk of the oak, and that nymphs and dryads, inclosed in the rugged bark, inhabited the mountains of Dodona.

The sphere of animals extends still farther these wonderful harmonies. We shall find in every creature, from the motionless shelly race, which pave and strengthen the capacious bed of the sea, to the fly that wings his way by night, over the plains of the torrid zone, glittering with rays of light like a constellation, the configurations of rocks, of vegetables, and of stars. A thousand ineffable passions, a thousand undescribable instincts animate them, and lead them to utter songs, cries, hummings, nay, even the articulate sounds of the human voice. Some of them live in noisy republics, others in profound solitude. The whole life of one species is employed in waging war, that of another in making love. In their combats they have every imagin-

able species of armour, and every possible method of using them, from the porcupine, who darts his pointed arrows at the foe, to the torpedo, who strikes invisibly, as with a stroke of electricity. Their loves are no less varied than their animosities. One must have his seraglio; another is satisfied with a transient mistress; a third unites himself to a faithful companion, whom he never abandons till death obliges them to separate. Man unites, in his enjoyments, their pleasures and their transports; and, when satiated, sighs, and demands of heaven felicity of another kind. We shall examine, simply by the light which reason affords, whether, subjected, by his body, to the condition of animals, whose every necessity he unites in himself, man is not, by his soul, allied to creatures of a superior order: whether nature, who has assigned the jurisdiction of her manifold terrestrial productions, to a being naked, destitute of instinct, and who must undergo an apprenticeship of several years in learning merely to walk, has reduced him, from his birth, to the alternative of studying their qualities, or of perishing; and whether she has not reserved to herself some extraordinary means of interposing for his relief, amidst the evils of every kind, which checker his existence, and which are, many of them, derived from beings of the same species with himself.

On reviewing the transitions which unite the different kingdoms, and which extend their limits to regions hitherto unknown, we shall not adopt the opinion of those who believe, that the works of nature, being the results of all possible combinations, must present every possible mode of existence. "You will find in them," say they, "at once, both order and disorder. Throw about the characters of the alphabet, in an infinite variety of ways, and you may form of them the Iliad, and poems, even superior to the Iliad; but you will have, at the same time, an infinity of formless assemblages." We adopt this comparison,

observing, however, that the supposition of the twenty-four letters of the alphabet suggests a previous idea of order, which it was necessary to admit as a foundation even to the hypothesis of chance. If, then, the multiplied throws of these twenty-four letters were to give, in fact, an infinite number of poems, good, bad, and indifferent, how many modes of existing must the principles, much more numerous, of existence in itself, such as the elements, colours, surfaces, forms, depths, movements, produce, were we to take but a single hundred of the modifications of each primordial combination of matter! We should have, at least, the general transitions of the different kingdoms. We should see plants walking on feet, like animals; animals fixed in the earth by roots, like plants; rocks, with eyes; herbs, which vegetated only in the air. The principal intervals of the spheres of existence would be filled up. But every thing that is possible does not exist. There exists nothing, indeed, but what is useful relatively to man. The same order which pervades the general combination of the spheres, subsists in the parts of each of the individuals that compose them. There is not one which possesses in its organs either defect, or redundancy. Their mutual adaptation is so perceptible, and they possess characters so striking, that if you were to shew to a naturalist of ability, any representation of a plant, or animal, which he had never seen, he could tell, from the harmony of its parts, whether it were a creature of the imagination, or a copy after nature. The students in botany, desirous, one day, of trying the skill of the celebrated Bernard de Jussieu, presented to him a plant, which was not in the collection of the royal garden, and begged him to indicate its genus and species. The moment he cast his eyes upon it, he replied, "This plant is artificially composed; you have taken the leaves of one, the stalk of another, and the flower of a third." This was precisely the fact. They had selected,

however, with the utmost art, the parts of such as exhibited the most striking analogy. I am confident, that, by the method I shall propose, the science may be carried infinitely farther, and that we shall be enabled to determine, at sight of an unknown plant, the nature of the soil in which it grew; whether it is a native of a hot, or a cold country; whether it is an inhabitant of the mountain, or of the stream; and, perhaps, even the animal species to which it is particularly allied.

While we study these laws, of which the greater part are either unknown, or neglected, we shall reject others, founded only on particular observations, that have been too much generalized. That the number and fecundity of created beings, for example, are in the inverse ratio of their magnitude; and that the time of their decay is in proportion to that of their increase. We shall shew, that there are mosses less prolific than the fir, and shell-fish less numerous than whales: such, among others, is the hammer-fish. There are animals which grow very fast, and decay very slowly: this is the case with the generality of fishes. We shall not trouble ourselves with proving that the longevity, the strength, the size, the fecundity, the form, of every being, is adapted, in a most admirable manner, not only to its individual happiness, but to the general happiness of all, from which results that of mankind. We shall reject those analogies, so commonly admitted, which are drawn from climate and soil, in order to explain all the operations of nature, by mechanical causes; for we shall demonstrate, that she frequently produces in these, both vegetables and animals, whose qualities, so far from resembling, are diametrically opposite to those of their climate, and soil. The tubulous and driest plants, such as reeds, rushes, as well as the birch, whose bark, similar to leather overlaid with oil, is incorruptible by humidity, grow by the water's side, like boats provided for crossing over. On

the contrary, plants, with the richest juices, and that are most humid, grow in the driest situations, such as the aloë, the taper of Peru, and the lianne, replete with water; which are to be found only in the parched rocks of the torrid zone, where nature has placed them like so many vegetable fountains. Even the instincts of animals appear to be less adapted to their own personal utility, than to that of man; and are sometimes in harmony with the nature of the soil which they inhabit, and sometimes at variance with it. The gluttonous hog delights in the mire, from which he is intended to purify the habitation of man; and the sober camel, to make his way through the burning sands of Africa, impervious, but for him, to every effort of the traveller. Even the appetites of these animals do not grow out of the places which they inhabit; for the ostrich, who inhabits the same deserts with the camel, is still more voracious than the hog. No one law of magnetism, of gravity, of attraction, of electricity, of heat, or of cold, governs the world. These pretended general laws, are nothing more than particular means. Our sciences mislead us, by ascribing to nature a false providence. They put, indeed, the balance into her hand, but it is not the balance of justice; no, it is only the balance of commerce. They weigh only the salts and the masses; the wisdom, the intelligence, and the goodness, they put aside. They are not afraid of depriving the heart of man of that sentiment of the divine qualities, which communicates to him so much force, and of accumulating on his mind, the weights and movements which oppress him. They put in opposition the squares of times and velocities, and neglect those admirable compensations which nature has interposed for the relief of living beings, by bestowing the most ingenious on the most feeble, the most abundant on the poorest, and by uniting all for the relief of the human species, no doubt, as being the most wretched.

We can know that only which nature makes us feel ; and we can form no judgment of her works but in the place, and at the time, she is pleased to display them. All that we imagine beyond this, presents only contradiction, doubt, error, or absurdity. I do not except from this description, even our ideal plans of perfection. For example, it is a tradition common to all nations, supported by the testimony of the scriptures, and founded on a natural feeling, that man has lived in a better order of things, and that he is destined to another, which is still to surpass it. We are incapable, however, of saying any thing of either the one or the other. It is impossible for us to add any thing to that in which we live, or take any thing from it, without rendering our condition in it the worse. Whatever nature has introduced into it, is necessary. Pain and death are among the proofs of her goodness. But for pain, we should be bruising ourselves, every step we took, without perceiving it. But for death, new beings could not be raised into existence ; and supposing those which are already in the world could be rendered eternal, that eternity would involve in it the ruin of generations, of the configuration of the two sexes, and of all the relations of conjugal, filial, and parental affection ; that is to say, of the whole system of actual happiness. In vain do we search, in our cradles, for the archives which our tombs refuse us : the past, like the future, covers our mysterious destiny with an impenetrable veil. In vain do we apply to it the light which illumines us, and seek, in the origin of things, the weights, the times, and the measures, which we find in their enjoyment ; the order which produced them has, with relation to God, none of these distinctions. The divisions of matter and time were made only for circumscribed, feeble, transient man. The universe, said Newton, was produced at a single cast. We are seeking for youth, in what was always old ; for old age, in what is always

young, for germs in species, births in generations, epochs in nature; but, when the sphere in which we live issued from the hand of its divine author, all times, all ages, all proportions, manifested themselves in it at once. That Etna might vomit out its fires, lavas, from the very first construction of those tremendous furnaces, must have been provided, which had not yet begun to flow. That the Amazonian river might roll its stream across America, the Andes of Peru must, from the beginning, have been covered with the snows, which the winds of the east had not yet accumulated upon them. In the bosom of new forests, ancient trees must have sprung up, that insects and birds might find their proper aliment in the aged rind. Carrion must have been created for the support of carnivorous animals. There must have been produced, in all the kingdoms of nature, beings young, old, living, dying, and dead. All the parts of this immense fabric must have appeared at the same instant; and if there was a scaffolding, to our eyes it has totally disappeared.

Let others extend the boundaries of our sciences, I shall consider myself as having rendered a more useful service to my fellow-creatures, if I am able to fix those of our ignorance. Our knowledge, like our virtue, consists in descending; and our strength in becoming sensible of our weakness. If I do not pursue the road which nature has reserved for herself, I shall, at least, walk in that which man ought to take. It is the only one which furnishes him with easy observations, useful discoveries, enjoyments of every description, without instruments, without a cabinet, without metaphysics, and without system.

To be convinced how agreeable it is, let us construct, in conformity to our method, some group, with the sites, the vegetables, and the animals, most commonly to be found in our climates. Let us suppose a soil the most obdurate, a craggy protuberance on the coast, near to where a river disgorges itself into the ocean, presenting a

steep towards the sea, and a gentle declivity towards the land. Let us suppose that, on the side turned toward the sea, the billows cover with foam its rocks clothed with sea-weed, fucuses, alga-marinas, of all colours and all forms, green, brown, purple, in tufts, and in garlands, as I have seen them, on the coasts of Normandy, affixed to the rocks of white marle, which the sea detaches from the main shore. Let us farther suppose, that on the side of the river, we see on its yellow sand, a scanty verdure, mixed with a little trefoil, and, here and there, a sprig of marine wormwood. Let us introduce some willows, not like those which grow in our meadows, but the natural produce of the soil, and similar to those which are to be seen on the banks of the Sprée, in the vicinity of Berlin, with broad bushy tops, and rising to the height of more than fifty feet. Let us not forget, in this arrangement, the harmony of different ages, which it is so pleasant to observe in every species of aggregation, but especially in that of vegetables. Let some of those willows be smooth and full of moisture, pushing their young branches into the air, and others of an aged form, with drooping head, and hollow trunk. Let us add to them, their auxiliary plants, such as the green mosses, and gilded lichen, (liver wort) which marble their grey rind, and some of those convolvuluses, that are vulgarly called lady's-smocks, which delight to cling about their trunk, and to embellish the branches, which have no flowers of their own, with leaves in form of a heart, and flowers white as snow, hollowed into the shape of a spire. Lastly, let us introduce the inhabitants natural to the willow, and its concomitant plants, their flies, butterflies, beetles, and other insects, together with the feathered animals, which make war on them, such as the water-hen, polished like the burnished steel, which catches them in the air; the wagtail, which pursues them on the land, making the movement from which it derives the name; and the king's-fisher,

which chases them along the surface of the water ;—and you will see a multitude of agreeable harmonies arising out of a single species of tree.

They are, however, still imperfect. To the willow let us oppose the alder, which is fond, in like manner, of the banks of the river, and which, by its form, resembling that of a long tower, its broad foliage, its dusky verdure, its fleshy roots, formed like cords running along the banks, and binding together the soil, forms a complete contrast with the extended mass, the light foliage, the white-streaked verdure, and the trundling roots of the willow. Add to these, the individuals of the alder, of different ages, rising like so many verdant obelisks, with their parasite plants, such as the maiden-hair, spreading into stars of verdure over the humid trunk, the long hart's-tongue, hanging from the boughs to the ground, and the other accessories of insects and fowls, and even of quadrupeds, which, probably, contrast as to form, colour, gait, and instinct, with those of the willow,—and we have a delicious concert of vegetables and animals, composed of two trees only.

If we illuminate our little plantation with the first rays of Aurora, we shall behold at once, shades that are deep, and others that are transparent, diffused over its bed ; a dusky and a silvered verdure intersecting each other, on the azure of the heavens, and their soft reflexes, blended together, moving in the bosom of the waters. Let us farther suppose, what neither poetry nor painting can pretend to imitate, the odour of the plants, and even the smell of the sea, the rustling of leaves, the humming of insects, the matin-song of the birds, the hollow murmuring noise, intermixed with silence, of the billows breaking on the shore, and the repetitions of all these sounds, repercussed by the distant echoes, which, losing themselves in the sea, resemble the voice of the Nereids : Ah ! if love, or philosophy, should ever tempt you to a solitude like this, you

will find in it an asylum more delightful to inhabit than are the palaces of kings.

Would you wish that sensations of a different order should be excited? would you wish to hear the voice of passion and sentiment burst from the bosom of the rock? Let the tomb of a virtuous and unfortunate man start up amidst the weeping willows, presenting this inscription to the eye:—HERE RESTS J. J. ROUSSEAU.

Would you wish to strengthen the impression of this picture, without doing, however, unnatural violence to the subject of it? change the time, the place, the monument; let our isle be Lemnos, the trees of those groves, laurels, and wild olives, and the tomb; the tomb of Philoctetes. Look at the grotto, which served as a habitation to that great man, when abandoned by the Greeks, whose battles he had fought; his wooden pot, the tatters in which he was clothed, the bow and arrows of Hercules, which had subdued, in his hands, so many monsters, and with which he, at last, wounded himself: and you will experience two powerful sensations at once, the one physical, which increases in proportion as you approach the works of nature, because their beauty discloses itself only to the eye which attentively examines it; the other moral, which increases in a contrary way, that is in proportion as you retire from the monuments of virtue, because to do good to men, and to be no longer within their reach, is a resemblance to the Deity.

What, then, would be the impression, were we to take a glance of the general harmonies of the globe? To dwell only on those which are best known to us, behold how the sun constantly encircles, with his rays, one half of the earth, while night covers the other with her shade. How many contrasts and concords result from their ever-changing oppositions? There is not a single point in the two hemispheres, in which there does not appear, by turns, a dawn, a

twilight, an aurora, a noon, a setting emblazoned with fire, and a night sometimes studded with stars, sometimes clothed in a sable mantle. The seasons walk hand in hand under his eye, like the hours of the day. Spring, crowned with flowers, precedes his car; summer surrounds it with her golden sheaves; and autumn follows, bearing her cornucopia running over with fruit. In vain would winter and night, retiring to the poles of the world, attempt to set bounds to his majestic career; in vain do they form in the polar seas of the north and the south, new continents, which have their vallies, their mountains, and their icy corruscations: the father of day, with his fiery shafts, overturns the fantastic fabric, and, without descending from his throne, resumes the empire of the universe. Nothing can screen itself from his prolific heat. From the bosom of the ocean, he raises into the air, the rivers, which are afterwards to flow through the old world and the new. He commands the winds to distribute them over islands and continents. Those invisible children of the air transport them under a thousand capricious forms. Sometimes they spread them over the face of heaven, like veils of gold and streamers of silk; sometimes they roll them in the form of frightful dragons and roaring lions, vomiting out torrents of fire and thunder. They pour them out on the mountains in as many different ways, in dews, in rains, in hail, in snow, in impetuous torrents. However fantastic may be the mode of performing their services, every part of the earth annually receives from them neither more nor less than its accustomed portion of water. Every river fills his urn, and every naiad her shell. In executing their commission, they display, on the liquid plains of the sea, the variety of their characters. Some hardly ruffle the smooth expanse; others swell it into billows of azure; and others turn it up from the bottom, with a dreadful noise, and dash it, foaming, over the rocky promontory.

Every place possesses harmonies peculiar to itself, and the harmonies it possesses are exhibited in rotation. Run over, whichever you please, a meridian or a parallel, you will find on it mountains of ice, and mountains of fire; plains of every kind of level, and hills of every curve; islands of all forms, and rivers of all currents; some spouting up, as if they issued from the centre of the earth, others precipitating themselves in cataracts, as if they descended from the clouds. This globe, however, agitated as it is with such a variety of convulsive movements, and loaded with burthens apparently so irregular, advances, nevertheless, in a steady and unalterable course through the immensity of the heavens.

Beauties of a different order decorate its architecture, and render it habitable to sensible beings. A girdle of palm trees, to which the date and the cocoa are suspended, surround it between the burning tropics; while it is crowned, under the polar circles, by magnificent forests of mossy firs. Other vegetables extend, like rays, from south to north, and, having reached a certain latitude, expire. The banana advances from the line to the shores of the Mediterranean. The orange crosses that sea, and embellishes, with its golden fruit, the southern extremities of Europe. The most necessary plants, such as corn and the gramineous tribes, penetrate the farthest, and, strong from their weakness, stretch, in the depth of the vallies, from the banks of the Ganges to the shores of the frozen ocean. Others, more robust, take their departure from the rude climates of the north, advance over the summit of Mount Taurus, and make their way, under favour of the snows, into the very bosom of the torrid zone. The fir and the cedar embellish the mountains of Arabia, and of the kingdom of Cachemire, and view at their feet the burning plains of Aden and Lahor, where the date and the sugar-cane are reaped. Other trees, enemies at once both to heat and to cold, have their center in the temperate zones. The vine languishes

in Germany and Senegal. The apple tree, a native of my own country, never saw the sun perpendicularly over its head, or describing round it the complete circle of the horizon, to ripen its beautiful fruit. Every soil, however, has its Flora, and its Pomona. The rocks, the morasses, the mire, the sand, have each vegetables peculiar to themselves. The very shallows of the sea are sensible to vegetation. The cocoa tree thrives only on the strand, and suspends its milky fruit over the billows of the briny deep. Other plants are adapted to the winds, to the seasons, to the hours of the day, with such exact precision, that, by means of them, Linnæus constructed botanical almanacks and time-pieces. Where is the being to be found, capable of describing the infinite variety of their figure? What cradles, arches, avenues, pyramids of verdure, loaded with fruits, present themselves, serving as so many enchanting habitations! What happy republics lodge under their tranquil shade! What delicious banquets are there prepared! No part of them is useless or waste. The quadrupeds eat of their tender foliage, the feathered race of their seeds, and other animals of the roots and the rind. The insects feed on the refuse. Their infinite legions are armed with every kind of instrument for collecting it. The bee has his thighs furnished with spoons lined with hair, for the purpose of retaining the fine powder of their flowers; the fly is provided with a pump, for sucking out the sap; the worm has an auger, a wimble, a file, to separate the solid parts; and the ant her pincers, for carrying off the crumbs. From the diversity of form, of manners, of governments, of all these animals, and the continual wars which they wage, you would suppose them a multitude of foreign and hostile nations, on the point of destroying each other. From their constancy in love, the perpetuity of their species, their wonderful harmony with all the parts of the vegetable kingdom, they suggest, again, the contrary idea

of a single people, which has its hereditary nobility, its carpenters, its pump-makers, and other artizans of various descriptions.

Other tribes hold vegetables in contempt, and are adapted to the elements, to day, to night, to tempests, and to different parts of the globe. The eagle trusts her nest to the rock, which loses itself in the clouds; the ostrich, to the parched sands of the desert; the rose-coloured flamingo, to the mires of the southern ocean. The white bird of the tropic, and the black frigate, delight to roam, in company, over the vast extent of the seas, to view from the highest regions of the atmosphere, the fleets of India toiling after them in vain, and to traverse, from east to west, the circumference of the globe, as if disputing with the sun for rapidity of flight. In the same latitudes, the turtle dove and the parroquet, less daring, travel only from isle to isle, with their young ones in their train, and picking up, in the forests, the grains of spicery, which they have brushed from the branches with their wings.

While fowls of this description preserve an equal temperature under the same parallels, others find it in the track of the same meridian. Long triangles of wild geese and of swans, are observed going and coming every year, from south to north, stopping only at the hoary limits of winter, winging their way, without astonishment, over the populous cities of Europe, and looking down with disdain on their fertile plains, presenting, as they do, furrows of green corn in the midst of snow: to such a degree is liberty preferable to abundance, even in the eyes of the animal creation! On the other hand, legions of heavy quails cross the sea, and go to the south, in quest of the summer's heat. Toward the end of September, they avail themselves of a northerly wind to take their departure from Europe, and flapping one wing, while they present the other to the gale, half sail, half oar, they graze the billows of the Mediterranean with their fat-

tened rump, and secrete themselves in the sands of Africa, to serve as food to the famished inhabitants of Zaza.

There are animals which travel only by night. Millions of crabs, in the Antilles, descend from the mountains, by the light of the moon, making, with their claws, a clamorous noise, and presenting to the Caribs, on the sterile strand of their isles, innumerable shells, replenished with exquisite marrow. At other seasons, on the contrary, the tortoise quits the sea, and lands on the same shores, to deposit her multitude of eggs in their barren sands.

The very ices of the pole are inhabited. We find in their seas, and under floating promontories of crystal, the black enormous whale, with more oil on his back than a whole plantation of olives could furnish. Foxes clothed in precious furs, find the means of living on shores abandoned by the sun; herds of rein-deer scratch up the snow, in search of moss, and advance, braying, into those desolate regions of night, by the glimmering light of the aurora borealis. Through a scheme of Providence, worthy of the highest admiration, places the most unprolific, present to man, in the greatest abundance, provisions, clothing, lamps, and firing, not an article of which is produced by himself.

How delightful would it be, to see the whole human race collecting all these various blessings, and communicating them to each other, in peace, from climate to climate! We look, with regular expectation, as winter departs, to the period when the swallow and the nightingale shall announce to us the return of days of serenity. How much more affecting would it be, to behold the people of different lands arrive, with the spring, on our shores, not with the dreadful noise of artillery, like modern Europeans, but with the sound of the flute and the hautboy, like the ancient navigators, in the earlier ages of the world! We should see the tawny Indian of southern Asia, forcing his way, as formerly, through the currents of its mighty rivers, in his

leathern canoe; penetrating, by the waters of the Petzora, to the extremities of the north, and displaying on the shores of the frozen sea the riches of the Ganges. We should see the copper-coloured Indian of America, in his hollowed log, traversing the extended chain of the Antilles, and conveying, from isle to isle, from shore to shore, perhaps to our own continent, his gold and emeralds. Numerous caravans of Arabs, mounted on camels and oxen, would be seen following the course of the sun, from pasture to pasture, and recalling the memory of the innocent and happy life of the ancient patriarchs. Winter itself would be no interruption to the communication of mankind. The Laplander, covered with warm fur, would arrive, under favour of the snow, in his sledge, drawn by rein-deer, and expose for sale in our markets, the sable skins of Siberia. Were men to live in peace, every sea would be navigated, every region would be explored, and all their productions be collected. How gratifying to curiosity would it be, to listen to the adventures of these foreign travellers, attracted to our country by the amenity of our manners! They would be eager to communicate, in return for our hospitality, the secrets of their plants, their industry, and their traditions, which they will ever conceal from our ambitious commerce. It is among the members of the vast family of mankind, that the fragments of its history are scattered. How interesting would it be, to learn the story of our ancient separation, the motives which determined the individual tribes to choose for themselves each a separate habitation on an unknown globe, and to traverse, as chance directed, mountains which, as yet, presented no path, and rivers that were without a name! What pictures would be exhibited to our view, in the descriptions they would give of those countries, decorated with a sublime magnificence, as they proceeded from the hands of nature, but wild, and unadapted to the necessities of man, devoid of experience!

They would paint to us the astonishment of their forefathers, at sight of the new plants which they found growing in every new climate, and the trials which they made of them, as the means of subsistence ; how they were aided, no doubt, in their necessitous circumstances, and in the exertions of their industry, by some celestial intelligence, who commiserated their distress ; how they gradually formed an establishment, and what was the origin of their laws, their customs, and their religions. What acts of virtue, what instances of generous love, have ennobled the deserts, and are unknown to our pride ! Because we have collected a few anecdotes, picked up, at random, by travellers, we flatter ourselves, that we have a clear insight into the history of foreign nations ; which is nearly the same as if they were to compose ours from the tales of a mariner, or the artificial representations of a courtier, amidst the jealousies of war, or the corruptions of commerce. The knowledge and the sentiments of a people are not deposited in books. They repose in the heads and the hearts of its sages ; if, indeed, there be on earth any secure asylum for truth. We have already judged such nations sufficiently ; it would not be uninteresting, if we were to submit to be judged in our turn, by them, and to profit by their expressions of astonishment, at sight of our customs, our sciences, and our arts. If it be delightful to acquire knowledge, it is still more delightful to diffuse it. The noblest reward of science is the pleasure of the ignorant man instructed. What a sublime satisfaction would it be to us, to enjoy their joy, to behold their dances in our public squares, and to hear the drums of the Tartar, and the ivory cornet of the negro, re-echo round the statues of our kings ! Ah ! if we were benevolent and good, I could picture them to myself, as struck with astonishment and sorrow, at the excessive and unfortunate populousness of our cities, inviting us to spread ourselves over their solitudes, to contract

marriages with them, and, by new alliances, to re-unite the scattered branches of the human race, which unhappily, are separating farther and farther, and which national prejudices disunite, still more than do ages and climates !

Alas ! blessings have been given us in common, and we share with each other only the ills of life. Man is every where complaining of the want of land, and the globe is covered with deserts. He alone is exposed to famine, while the whole animal creation, to the very insects, are rioting in plenty. He, almost every where, is the slave of his equal, while the feeblest animals maintain their liberty against the strongest. Nature, who designed him for love, denied him arms, and he has forged them for himself, to combat his fellow men. She presents to all her children asylums and banquets ; and the avenues of our cities announce our approach to them only by the sad spectacles of wheels and gibbets. The history of nature is an exhibition only of blessings, that of man, nothing but robbery and madness. His heroes are the persons who have rendered themselves the most formidable. Every where he despises the hand that spins his garments, and cultivates for him the fertile bosom of the earth ; while he esteems his deceiver, and reveres the tyrant that oppresses him. Always dissatisfied with the present, he is the only being that regrets the past, and trembles at the thought of futurity. Nature has granted to him alone, the knowledge of a Deity, and a thousand inhuman religions have sprung up out of a sentiment so simple and so consolatory. What, then, is the power which has thus opposed barriers to the power of nature ? What illusion has misled that marvellous reason, which has invented so many other arts, and neglected the art of being happy ? Ye legislators, boast no longer of your laws. Either, man is born to be miserable ; or the earth, every where, watered with his blood, and with tears, accuses you all of having misunderstood those of nature.

He who does not adapt himself to his country, his country to mankind, and mankind to God, is no more acquainted with the laws of politics, than the man, forming a system of physics for himself alone, and separating his personal relations from all connexion with the elements, the earth, and the sun, would be acquainted with the laws of nature. To the investigation of these divine harmonies, I have devoted my life, and this work. If, like so many others, I have gone astray, my errors, at least, shall not be fatal to my religion. Religion alone has appeared to me to be the natural bond of mankind, the hope of our sublime passions, and the complement of our miserable destiny. Happy shall I esteem myself, if I have been sometimes able to prop, with my feeble efforts, the sacred edifice, assailed as it is at present, on every side! But, its foundations rest not on the earth, and its stately columns raise their heads to the heavens. However bold some of my speculations may be, they afford no countenance to the wicked. While, perhaps, more than one Epicurean will be convinced by them, that man's supreme felicity, consists in virtue; good citizens may find in them new means of being useful. If, however, but a single unfortunate wretch, ready to sink at the melancholy spectacle which the world presents, shall revive, on beholding, in nature, a father, a friend, a remunerator, I shall receive the full recompense of my labour.

Such was the vast plan I proposed to execute. I had collected, for this purpose, more materials than I had occasion for. But a variety of obstacles has prevented my making a complete arrangement of them. In happier times, I shall, perhaps, resume this employment. Meanwhile, I have selected what I conceived was sufficient to convey an idea of the harmonies of nature; and though my labours are reduced to simple studies, I have taken care to preserve in them as much order, as was necessary to unveil my original design; in like manner as a peristyle, an arcade

half in ruins, avenues of columns, fragments of walls, present to travellers, in an isle of Greece, the image of an ancient temple, notwithstanding the ravages of time, and of the barbarians who demolished it.

In setting out, I change scarcely any thing of the first part of my work, the distribution excepted. I there display, in the first place, the benefits conferred by nature on the age in which we live, and the objections which have been raised to the providence of their author. I next, reply successively to those which are derived from the disorder of the elements, of vegetables, of animals, and of man; as well as to those which are levelled against the nature of God himself. I can aver with truth, that I have treated these subjects, without any personal consideration whatsoever. Having replied to objections, I propose objections, in my turn, to the elements of our sciences, which we deem so infallible; and I combat, in particular, that pretended principle of our knowledge, which we call *reason*.

Having cleared the ground of our opinions, in my first studies, I proceed in those that follow, to rear the fabric of human knowledge. I examine what is the degree of human intelligence, at the point where the light of nature fixes its boundary; and what we understand by the terms beauty, order, virtue, and their contraries. I deduce my evidence, from several laws, physical and moral, the sentiment of which is universal among all nations of the globe. I afterwards make applications of these physical laws not to the order of the earth, but to that of plants.

I balanced long, I acknowledge, between these two orders. The first would have exhibited, I am aware, relations entirely new, useful to navigation, to commerce, and to geography. But the second has presented me with relations equally new, equally agreeable, more easily demonstrable to the generality of readers, of high importance to agriculture, and, consequently, to the most numerous

class of mankind. Beside, some of the harmonic relations of this globe will be illustrated in my answers to the objections against Providence, as well as in the elementary relations of plants, and that in a manner sufficiently at large to demonstrate the existence of this new order. And the vegetable order has, moreover, furnished me with occasion to speak of those relations of the globe, which extend directly to animals and to men; and of the earliest voyages of the human race, to the principal quarters of the world.

I apply, in the following study, the laws of nature to man. I establish the proofs of the immortality of the soul, and of the existence of the Deity, not from the principles of our reason, which so frequently mislead us, but from an immediate feeling, which never either deceives or betrays. I refer to those physical and moral laws, the origin of our principal passions, love and ambition, and even the causes which interrupt their enjoyment, and which render our pleasures so transient, and our regret so profound. I flatter myself, that these proofs will be found interesting; not from their novelty alone, but also from their simplicity.

I proceed, afterwards, from these notions, to propose the palliatives, and the remedies, adapted to the ills of civil society, the representation of which is delineated in the first volume of my work.* It was not my wish to imitate the example of moralists in general, who satisfy themselves with lashing vice, or else with turning it into ridicule, without either assigning the principal causes, or indicating the remedies: much less shall I act the part of our modern politicians, who foment vice, in order to make a gain of it. I am vain enough to hope, that this last study, which has been a most agreeable one to myself, will exhibit more views than one, which may be rendered beneficial to my country.

* The first volume of the original ends with Study VI.

The rich and the great imagine, that every one who does not live as they do, is miserable and out of the world; whereas, it is themselves who, living at a distance from nature, are out of the world. They would find thee, O eternal beauty, always old, yet always new!* they would find thee, O life, pure and blisful, of all those who truly live! if they sought thee only within themselves. Wert thou a steril mass of gold, or a victorious prince, that tomorrow shall not be to be found, or some fascinating and deceitful wanton, they would perceive thee, and ascribe to thee, the power of conferring upon them some pleasure. Thy vain nature would then find employment for their vanity. Thou wouldst be an object proportioned to their timid and groveling thoughts. But because thou art too much within themselves, where they never choose to enter, and too magnificent without, diffusing thyself through infinite space, thou remainest to them an unknown God.† In losing themselves, they have lost thee. The order, nay, the very beauty, with which thou hast invested all thy creatures, to serve as so many steps by which man may raise himself to thee, are transformed into a veil, which conceals thee from his sickly eyes. Men have no sight but for vain shadows. The light dazzles them. Mere nothings are to them every thing; and what is every thing passes with them for nothing. Nevertheless, he who never saw thee, has never seen any thing; he who has no relish for thee, is an utter stranger to true pleasure; he is precisely as if he were not, and his whole life is only a miserable dream. Misled by the prejudices of a faulty education, I have myself, O my God, pursued a vain felicity, in systems of science, in arms, in the favour of the great, and sometimes in frivolous and dangerous pleasures. In all these wearisome agitations, I was hunting after calamity, while

* Saint Augustin's *City of God*.† Fenelon on the *Existence of God*.

true happiness was close by my side. At a distance from my native land, I sighed for joys which I could not find; and, at the same time, thou wert bestowing on me blessings innumerable, scattered by thy bountiful hand over the whole earth, which is the country of mankind. I disquieted myself to think that I had no powerful protector, that I belonged to no corps; and I have been protected by thee amidst a thousand dangers, in which their patronage could have afforded me no assistance. It grieved me to think of living alone, unnoticed and unregarded; and thou hast vouchsafed to teach me, that solitude is far preferable to the bustle of a court, and liberty to all human grandeur. It filled me with many a painful reflection, that I had not the felicity of being directed to some fair spouse, who should be the companion of my life, and the center of my affections; and thy wisdom led me to her habitation, and discovered to me, in each of her productions, an immortal Venus. I never ceased to be happy, but when I ceased to place my confidence in thee. O God! give to these labours of a man, I do not say the duration or the spirit of life, I dare not ask it, but the freshness of the least of thy works! Let their divine graces be transfused into my writings, and bring back a corrupted age to thee, as I have myself been brought back! Opposed to thee, all power is weakness; supported by thee, weakness becomes irresistible power. When the rude blasts of the north have ravaged the earth, thou callest for the feeblest of thy winds; and at the sound of thy voice, the zephyr breathes, the verdure revives, and the bosom of the bleak rock is covered by the gentle primrose and the humble violet, as with a mantle of gold and purple.

STUDY II.

BENEFICENCE OF NATURE.

THE majority of mankind, in civilized countries, look on nature with indifference. They are in the midst of her works, and they admire only human grandeur. What charm is there in the history of men that can render it, after all, so interesting? It has to boast of vain objects of glory alone, of uncertain opinions, of bloody victories, or at most of labours that are useless. If it deigns, now and then, to speak of nature, it is only to tell us of the ravages which she has committed, and to charge her with calamities, which may all be traced to our own imprudence. With what unremitting attention, on the contrary, is this common mother providing for her children, the means of happiness! She has diffused her benefits from pole to pole, with the sole view of engaging us to unite in a mutual communication of them. She is incessantly recalling us from the prejudices which unhappily separate mankind, to the universal laws of justice and humanity, by frequently placing the ills of life in the hands of the so highly vaunted conquerors, and its pleasures in those of the oppressed, whom we hardly look upon with an eye even of pity. When the princes of Europe issued forth, with the gospel in their hand, to ravage Asia, they brought back with them the pestilence, the leprosy, and the small-pox; but the coffee-plant, in the mountains of Yemen, nature discovered to a Dervise, and

thus produced, at one and the same time, our plagues from our croisades, and our delicious beverage from the cup of a Mahometan monk. The descendants of those princes usurped the continent of America, and they have transmitted to us, by means of this usurpation, an inexhaustible succession of wars and venereal diseases. While they were exterminating the inoffensive inhabitants by their murderous artillery, a Caraïb, in token of peace, invited the sailors to smoke of his calumet; the perfume of the tobacco dissipated their chagrin, and the use of it is disseminated over the whole earth; and thus, while the miseries of two worlds are issuing from the mouth of the cannon, which kings denominate their *ultima ratio*, the consolations of the civilized states of Europe flow from the pipe of a Savage.

To whom are we indebted for the use of sugar and chocolate; for so many agreeable articles of subsistence, and so many salutary medicines? To naked Indians, to poor peasants, to wretched negroes. The spade of slaves has done more good, than the sword of conquerors has done mischief. But in which of our squares are to be found the statues of our obscure benefactors? Our historians have not vouchsafed so much as to preserve their names. But, we need not go so far, to search for proofs of the obligations which we owe to nature. Is it not to the study of her laws, that Paris is indebted for acquisitions so variously multiplied, collected from every quarter of the globe, combined a thousand different ways, and reflected over Europe in sciences the most ingenious, and in enjoyments the most refined, and of every species? Where is now the time, when our forefathers leaped for joy, at finding a wild plumb-tree on the banks of the Loire; or, at catching a poor roe in the chace, in the vast plains of Normandy? Our fields, so richly clothed at present with harvests, with orchards, and with flocks, did not then produce the common necessaries of life. Men, wandered up and down,

living on the precarious supplies of hunting, and not daring to trust to nature for subsistence. Her simplest phenomena filled them with terror. They trembled at the sight of an eclipse, of an *ignis-fatuus*, of a branch of mistletoe on the oak. Not that they believed the affairs of the world to be surrendered to chance. No, they recognized every where gods possessed of intelligence; but not daring to believe them good, while cruel priests were their instructors, those unfortunate people imagined that they took pleasure only in tears, and they sacrificed to them human victims, on the very spot, perhaps, on which now stands a receptacle for the wretched.*

Let us suppose a philosopher, like Newton, to have treated them with the spectacle of some of our natural sciences, and to have shewn them with the microscope, forests in moss, mountains in grains of sand, thousands of animals in drops of water, and all the wonders of nature,

* There are French writers who have composed the eulogium of the Druids. I shall oppose to these writers, among other authorities, that of the Romans, who, it is well known, were abundantly tolerant in matters of religion. Cæsar, in his Commentaries, informs us, that the Druids, in honour of their Gods, burnt men in baskets of osier, and that when criminals were wanting for this horrible purpose, they sacrificed even the innocent. Suetonius, in his life of Claudius, expresses himself thus, "The religion of the Druids, too cruel, it must be confessed, and which, from the time of Augustus, had been simply forbidden, was by Claudius entirely abolished." Herodotus had, long before, loaded them with the same reproach. All that can be opposed to this testimony is the romance of Astræa. Have we not faults enough of our own, without undertaking the difficult task of justifying those of our ancestors? They were not indeed more culpable than other nations, which also presented human sacrifices to the Divinity. Plutarch reproaches the Romans themselves with having immolated, in the earlier times of the republic, two Gauls and two Greeks, whom they buried alive. Is it possible then, that the first sentiment of man, in a state of nature, could have been that of terror; and that he must have believed in demons before he believed in God? Certainly not. It is man who universally has misled man. One of the great benefits of the Christian religion has been the abolition it has effected, in a considerable part of the world, of those inhuman doctrines and sacrifices.

which in a downward progress to nothing, multiplies the resources of her intelligence, while the human eye becomes incapable of perceiving the boundary. Let us suppose that afterwards, discovering to them, in the Heavens, a progression of greatness, equally infinite, he had shewn them, in the planets, scarcely perceptible to the eye, worlds much greater than ours, Saturn, three hundred millions of leagues distant; in the fixed stars, infinitely more remote, suns, which probably illumine other worlds; in the whiteness of the milky way, stars, that is, suns, without number, scattered about in the heavens, as grains of dust on the earth, without its being known to man, whether all this may be any thing more than the mere threshold of creation: with what transports would they have viewed a spectacle, which we observe, every day, without emotion?

But I would rather suppose, that, unprovided with the magic of science, a man like Fenelon had presented himself to them in all the majesty of virtue, and thus addressed the Druids:—" You frighten yourselves with the very terrors " which you instil into the people, God is just. He gives " to the wicked terrible apprehensions, which recoil on " those who propagate them. But he speaks to all men in " the blessings he bestows. Your religion would govern " men by fear; mine draws them with cords of love, and " imitates his sun in the firmament, which he causes to " shine on the evil and on the good." Let me suppose, that after this, he had distributed among them the simple presents of nature, till then unknown, sheaves of corn, slips of the vine, sheep clothed with the woolly fleece: who can express what would have been the gratitude of our forefathers? They would, perhaps, have fled with terror from the inventor of the telescope, mistaking him for a spirit; but they would certainly have worshipped the author of Telemachus.

Yet these are but the smallest part of the blessings for which their rich descendants stand indebted to nature. I have said nothing of that infinite number of arts which are employed by them, in our own country, for the purposes both of knowledge and pleasure; nothing of that terrible invention of artillery, which secures to them the enjoyment of these arts, while the noise of it never disturbs their repose at Paris, unless to announce victories; nothing of that new, and still more wonderful art of electricity, which protects* their habitations from thunder; and nothing of

* On the subject of the effects of electricity, a thought, abundantly impious, has been expressed in a Latin verse, of which the sense is, that Man has disarmed the Deity. Thunder is by no means a particular instrument of divine justice. It is necessary to the purification of the air in the heats of summer. God has permitted to man sometimes to dispose of it, as he has given him the power of using fire, of crossing the ocean, and of converting every thing in nature to his advantage. It is the mythology of the ancients, which, representing Jupiter always wielding the thunder, has inspired us with so much terror. We find in the holy scriptures ideas of the Divinity much more consolatory, as well as a better system of philosophy. I may, perhaps, be mistaken, but I do not believe there is a single passage in which thunder is mentioned in the Bible, as an instrument of divine justice. Sodom was destroyed by a shower of fire and brimstone. The ten plagues with which Egypt was smitten, were the corruption of the waters, swarms of reptiles, lice, flies, the pestilence, ulcers, hail, caterpillars, thick darkness, and the death of the first-born. Corah, Dathan, and Abiram were consumed by fire, that issued out of the earth. When the Israelites murmured in the wilderness of Paran, the fire of the Lord burnt among them, and consumed them that were in the uttermost parts of the camp. Numb. xi. 1. In the threatenings denounced against the people in Leviticus, no mention is made of thunder. On the contrary, it was amidst the noise of thunder, that God promulgated his law to his chosen people from Mount Sinai. Finally, in that sublime piece of poetry, in which Daniel summons all the works of the Lord to praise him, he calls, among the rest, upon the thunder, and it is not foreign to remark, that he includes, in his summons, all the meteors which enter into the necessary harmony of the universe. He qualifies them with the lofty title of *angels and hosts* of the Lord. [*The author refers us to Daniel, chap. iii. but we find nothing in the writings of this prophet upon the subject in question: and in Psalm cvlviii. of David, which is probably the passage he had in his mind, thunder is not mentioned, unless we suppose it included in the general denomination of fire.*]

the privilege which they enjoy, in this venal age, of presiding in all states over the happiness of men, when they believe themselves to have nothing more to dread from the powers of earth and heaven. The whole world, indeed, is solely occupied in the furtherance of their pleasures. England, Spain, Italy, the Archipelago, Hungary, all southern Europe, is adding, every year, wools to their wools; wines to their wines, silks to their silks. Asia sends them diamonds, spices, muslins, chintzes, and porcelain; America, the gold and silver of her mountains, the emeralds of her rivers, the dyes of her forests, the cochineal, the sugar cane, and the cocoa-nut of her fervid plains, which their hands have had no share in cultivating; Africa, her ivory, her gold, and the very children of her bosom, which serve them as beasts of burden, all over the globe. There is not a portion either of the earth or of the sea that does not furnish them with some article of enjoyment. The gulphs of the ocean provide them with pearls, its shallows with ambergris, and its icy promontories with furs. At home they have reduced the rivers and mountains to a state of vassalage, in order to reserve to themselves feudal rights to fisheries and manors. But there was no occasion to put themselves to so much expence. The sands of Africa, where they have no game-keeper, send them, in clouds, quails and other birds of passage, which cross the sea in spring to cover their table in autumn. The northern pole, where they have no cruiser, pours on their shores, every summer, legions of mackarel, of cod, and of turbot, fattened in the long nights of its winter. Not only the fowls and the fishes change for them their climate, but the very trees themselves. Their orchards were formerly transplanted from Asia, as now their parks are from America. Instead of the chesnut and walnut, which surrounded the farms of their vassals, in the rustic domains of their ancestors, the ebony, the sorb-apple of Canada, the great chesnut of

India, the magnolium, the tulip-bearing laurel, encircle their country palaces with the umbrage of the new world, and, ere long, they will be encircled also with its solitudes. They have summoned the jasmin from Arabia, the orange from China, the pine-apple from Brazil, and a multitude of sweet-scented plants from every region of the torrid zone. They have no longer occasion for suns; they dispose as they please of latitudes. They can convey the heats of Syria to exotics in their hot-houses, at the very season when their poor peasants are perishing with the cold of the Alps in their hovels. Not one of the productions of nature can escape their avidity. What they cannot have living, they contrive to have dead. The insects, birds, shell-fish, minerals, nay, the very soil of the most distant lands, enrich their cabinets. Painting and engraving present them with the prospects, and procure for them the enjoyment, of the Glaciers of Switzerland, during the burning heat of the dog-days, and of the spring of the Canaries, in the midst of winter. The intrepid navigator brings back to them, from regions into which the arts dare not penetrate, journals of voyages, still more interesting than the productions of the pencil, and redouble the silence, the tranquillity, the security of their nights, sometimes by a recital of the horrible tempests of Cape Horn, sometimes by that of the dances of the happy islanders of the South Seas.

Not only does every thing that now exists, but ages that are past, contribute to their felicity. It is no longer for the temple of Venus, that Corinth invented those beautiful columns, rising like palm trees; but to support the alcoves of their beds. There a voluptuous art veils the light of day, through taffetas of every colour; and, imitating the softened reflexes either of moonlight or of morning, represents the objects of their loves like so many Dianas or Auroras. The art of Phidias has produced for them a contrast to female beauty in the venerable busts of a Socrates and

a Plato. Obscure scholars, by efforts of labour which nothing can remunerate, have brought them acquainted with the sublime geniuses who were the ornaments of the world, in times almost as remote as the creation; Orpheus, Zoroaster, Æsop, Lokman, David, Solomon, Confucius, and a multitude of others unknown even to antiquity. It is no longer for the Greeks, it is for them, that Homer still sings of heroes and of Gods, and that Virgil warbles the notes of the latin flute, which ravished the ears of the court of Augustus, and rekindled the love of country and of nature. For them it is that Horace, Pope, Addison, La Fontaine, Gesner, have smoothed the rough paths of wisdom, and rendered them more accessible and more lovely than the treacherous declivities of folly. A multitude of poets and historians of all nations, Sophocles, Euripides, Corneille, Racine, Shakespear, Tasso, Xenophon, Tacitus, Plutarch, Suetonius, introduce them into the very closets of those terrible princes, who bruised with a rod of iron the head of the nations, whose happiness was intrusted to their care; and thereby lead them to rejoice in their more tranquil destiny, and to hope for a better still under the reign of another Antoninus. Those vast geniuses of all ages and of all countries, celebrating, without concert with each other, the undecaying lustre of virtue, and the providence of heaven in the punishment of vice, add the authority of their sublime reason to the universal instinct of mankind, and multiply a thousand and a thousand times, in their favour, the hopes of another life of longer duration and more exalted felicity.

Would it not be reasonable to expect that a chorus of praise should ascend, day and night, from every habitation, to the author of nature? Never did the ancient kings of Asia accumulate so many means of enjoyment in Susa, or Cebatana, as our common tradesmen do in Paris. Those monarchs, nevertheless, every day, paid adoration to the

gods ; till the gods were consulted, they would engage in no enterprize ; till the libation of religious acknowledgement was poured out, they would not so much as sit down to table. Would to God, that our Epicureans were chargeable only with indifference to the hand which is continually loading them with benefits, But murmurs against Providence are now heard to arise from the very lap of plenty and pleasure ; and it is from their libraries, stored with so many sources of knowledge, that issue forth the black clouds, which have obscured the hopes and the virtues of Europe,

STUDY III.

OBJECTIONS AGAINST PROVIDENCE.

“ THERE is no God,” say these pretended sages. Look, “ for instance, at the work, and form from thence your “ judgment of the workman.* Observe, first, this globe “ of ours, destitute both of proportion and symmetry. “ Here it is deluged by vast seas ; there it is parched with “ thirst, and presents only wildernesses of barren sand. A “ centrifugal force, occasioned by its diurnal rotation, has “ forced out at its equator enormous mountains, while to “ the poles it has flattened it ; for the globe was originally “ in a state of softness, whether it was a mud recovered “ from the empire of the waters, or, what is more probable, “ a scum detached from the sun. The volcanoes, scattered

* See the answer to this objection in Study IV.

“ over the earth, demonstrate, that the fire which formed
“ it, is still under our feet. Over this scum, so wretchedly
“ levelled, the rivers run as chance directs. Some of them
“ inundate the plains; others are swallowed up, or else
“ precipitate themselves in cataracts, while we observe
“ in none of them a regular current. The Islands
“ are merely fragments of the continent, violently separated from it by the ocean, and the continent itself, a
“ mass only of hardened clay. Here, the unbridled deep
“ devours its shores; there, it abandons them, and exhibits
“ new mountains, which it has formed in its womb.
“ Amidst this conflict of elements, this baked lump is growing every day, colder and colder. The ices of the poles,
“ and of the lofty mountains, advance into the plains, and
“ insensibly extend the uniformity of an eternal winter
“ over this mass of confusion, ravaged by the winds, the
“ fire, and the waters.

“ In the vegetable world, the disorder increases upon
“ us.* Plants are a fortuitous production of humidity and
“ drought, of heat and cold, the mould merely of the
“ earth. The warmth of the sun makes them spring up,
“ the cold of the poles destroys them. Their sap obeys
“ the same mechanical laws with the liquid in the thermometer, and in capillary tubes. Dilated by heat, it
“ ascends through the wood, and re-descends through
“ the rind, following the vertical column of the air,
“ which gives it its direction. Hence it is that all vegetables rise perpendicularly, and that the inclined plane
“ of a mountain, can contain no more than the horizontal
“ plane of its base, as may be demonstrated by geometry. Beside, the earth is an ill-assorted garden, which
“ presents, almost every where, useless weeds, or mortal
“ poisons.

* The answer is in STUDY V.

“ As to its animals, which we better understand, because
“ they are brought nearer to us by similar affections and
“ similar wants, they present still greater incongruities.*
“ They proceeded at first from the expansive force of the
“ earth, and were formed out of the fermented mire of the
“ ocean and of the Nile, as certain historians assure us, and,
“ among others, Herodotus, who had his information from
“ the priests of Egypt. Most of them are devoid of all
“ proportion. Some have enormous heads and bills, as the
“ toucan; others long legs and long necks, like the crane;
“ these have no feet at all, while those are furnished with
“ them by hundreds, and others again have their feet dis-
“ figured by superfluous excrescences, as the unmeaning spurs
“ of the hog, for instance, which, affixed at the distance of
“ some inches from the ground, can certainly be of no
“ service to him in walking. There are animals scarcely
“ capable of motion, and which come into the world in a
“ state of palsy; such is the sloth or sluggard, who is unable,
“ with all his efforts, to travel the distance of fifty paces
“ a day, and who utters, as he goes, the most lamentable
“ screams. Our cabinets of natural history are filled with
“ monsters; bodies with two heads, heads with three eyes,
“ sheep with six feet, &c. which demonstrate that nature
“ acts at random, and proposes to herself no determinate end,
“ unless it be that of combining all possible forms; and after
“ all this plan would denote an intention which its monotony
“ disavows. Our painters will always imagine many more
“ beings than she can possibly create. Add to all this, the
“ rage and fury which desolate every thing that breathes;
“ the hawk devours the harmless dove in the very face of
“ heaven itself.

“ But the discord which prevails among animals is nothing
“ when compared with the madness which agitates the

* In Study VI.

“human race”. First, the different species of men, scattered
“over the earth, demonstrate that they do not all proceed
“from the same origin. They are black, white, red, tawny,
“and lead coloured. There are some who have wool instead
“of hair, others that are without a beard. There are dwarfs,
“and there are giants. Such are, in part, the varieties of the
“human species, which is every where equally odious to
“nature, and no where nourished by her with perfect good
“will. Man alone, of all sensible beings, is obliged to
“cultivate the earth, in order to subsist; and, as if this unna-
“tural mother were determined to prosecute, with unrelenting
“severity, the child she has brought forth, insects devour the
“seed as he sows it, hurricanes sweep away his harvests, fero-
“cious animals prey on his cattle, volcanoes and earthquakes
“overthrow his cities, and the pestilence, which, from time
“to time, makes the circuit of the globe, threatens at length
“his utter extermination.

“He is indebted to his own hands for his intelligence; his
“morality is the creature of climate; his governments are
“founded in force, and his religion in fear. Cold gives him
“energy, heat relaxes him. Warlike and free in the north,
“he is between the tropics a coward and a slave. His only
“natural laws are his passions. And what other laws should
“he look for? If they sometimes lead him astray, is not
“nature, who bestowed them, an accomplice in his errors.
“But he is made sensible of their impulse, only as a warning
“never to gratify them. The difficulty of finding sub-
“sistence, the wars, the imposts, the prejudices, the calumnies,
“the implacable enemies, the perfidious friends, the
“treacherous females, four hundred sorts of bodily distempers,
“those of the mind too, both more cruel and more numerous,
“in short, the ills of every kind, to which he is heir, render
“him the most wretched of creatures that the sun ever visited

" with his light. It were better for him that he had never
 " been born. He is every where the victim of some tyrant.
 " Other animals have at least the means either of combating
 " or of flying; but man has been thrown upon the earth by
 " chance, without an asylum, without claws, without fangs,
 " without velocity, without instinct, and almost without a
 " skin; and, as if it were not enough for him to be persecuted
 " by all nature, he is in a state of perpetual war with his
 " own species. In vain would he try to defend himself
 " from it: virtue steps in and binds his hands, that vice,
 " in safety, may cut his throat. He has no choice but to
 " suffer and to be silent.

" What, after all, is this virtue, about which man
 " makes such parade? A combination of his imbecility; a
 " result of his temperament. With what illusions is it fed?
 " with absurd opinions, founded merely on the sophisms of
 " designing men, who have acquired a supreme power, by
 " recommending humility, and immense riches, by preach-
 " ing up poverty. Every thing expires with us. From
 " experience of the past, let us ^{we can} form a judgment of the
 " future: we were nothing before we were born; we shall
 " be nothing after we die. The hope of our virtues is of
 " human invention, and the instinct of our passions of di-
 " vine institution.

" But there is no God.* If there were, he would be
 " unjust. What being of unlimited power and goodness,
 " would have exposed to so many ills, the existence of his
 " creatures, and so ordained it, that the life of some could
 " only be supported by the death of others? So many
 " disorders are so many proofs that there is no such being
 " as a God. It is fear that gave him existence. How
 " must the world have been astonished at this metaphysical
 " idea, when the first man, under the influence of terror,

* In Study VIII.

“ thought proper to exclaim that there was a God ! What
 “ could have made him God ? Why should he be God ?
 “ What pleasure could he take in this perpetual circle of
 “ woes, of regenerations, and deaths ? ” *

* The solution of these objections will be found by the numeral characters which correspond to each particular *STUDY*. They are all refuted there, directly or indirectly ; for it was not possible to follow, in a work of this kind, the scholastic order of a system of philosophy.

STUDY IV.

THE OBJECTIONS AGAINST PROVIDENCE ANSWERED.

SUCH are the principal objections which have been raised, in almost every age, against Providence, and which no one, I trust, will accuse me of having weakened by my statement. Before I attempt a refutation of them, I must be permitted to make a few reflections on the persons by whom they are maintained.

If these murmurings proceeded from some wretched mariner, exposed at sea to all the revolutions of the atmosphere, or from some oppressed peasant, loaded with the contempt of that very society whom his labour is nourishing, my astonishment would vanish. But our atheists are, for the most part, securely sheltered from the injuries of the element, and especially from those of fortune. The majority of them, have never so much as travelled : and as to the ills of civil society, they are unreasonable to complain, for they enjoy its sweetest and most respectful

homage, after having burst asunder all its bands, by the dissemination of their opinions. What have they not written on friendship, on love, on patriotism, and all the affections of the human heart, which they have reduced to a level with those of the beasts, while some of them, by the sublimity of their talents, might have rendered those affections almost divine ! Are they not themselves, in great measure, the cause of our calamities, by flattering, in a thousand different ways, the passions of our modern tyrants, while a cross rising in the midst of a desert comforts the miserable ? It is a matter of no small difficulty to retain these last within the bounds of a rational devotion ; and it is a moral phenomenon, which appeared to me, for a long time, inexplicable, to behold, in every age, atheism springing up amongst men, who had most reason to extol the goodness of nature, and superstition amongst those, who have the fairest ground of complaint against her. It was amidst the luxury of Greece and Rome, in the bosom of the wealth of Indostan, of the pomp of Persia, of the voluptuousness of China, of the overflowing abundance of European cities, that men first started up, who dared to deny the existence of a Deity. On the contrary, the houseless Tartars, the savages of America, continually exposed to famine, the Negroes, without foresight and without a police, the inhabitants of the rude climates of the north, such as the Laplanders, the Greenlanders, the Esquimaux, see gods every where, even in a flint.

I long thought that atheism, in the wealthy and luxurious, was a dictate of conscience. I supposed them to reason thus : " I am rich, and I am a knave, therefore, there is " no God. Beside, if there be a God, I have an account " to render." But these reasonings, though natural, are not general. There are atheists who possess legitimate fortunes, and who make a moral use of them, at least, externally. Besides by parity of reason, the poor man ought

to argue thus: "I am industrious, honest, and miserable, " therefore, there can be no Providence." But it is in nature herself, that we must look for the source of this unnatural logic.

The poor, in all countries, rise early, cultivate the ground, and live in the open air and in the fields. They are penetrated with that active power of nature which fills the universe. But their reason, sinking under the pressure of calamity, and distracted by their daily wants, is unable to support its lustre. It stops short without generalizing, at the sensible effects of this invisible cause. They believe, from a sentiment natural to weak minds, that the objects of their religious worship will be at their disposal, in proportion as they are within their reach. Hence it is, that the devotions of the common people, in every country, are presented in the fields, and have natural objects for their center. Such objects always call forth the religion of the peasantry. A hermitage on the side of a mountain, a chapel at the source of a stream, an image of the virgin in wood, tolerably nitched in the trunk of an oak, or under the foliage of a hawthorn, have to them a much more powerful attraction than the gilded altars of our cathedrals. I except those, however, whom the love of money has completely debauched, for such persons must have saints of silver, even in the country. The principal religious acts of the people, in Turkey, in Persia, in the Indies, and in China, are pilgrimages in the fields. The rich, on the contrary, prevented in all their wants and wishes by men their fellow, no longer look up to God for any thing. Their whole life is passed within doors, where they see only the works of human industry, lustres, wax candles, mirrors, secretaries, parasites, books, wits. They lose, by degrees, all sight of nature, whose productions are, beside, almost always exhibited to them disfigured or out of season, and represented as the effect of the art of their gardeners or their artisans.

They fail not also to interpret her sublime operations by the mechanism of the arts most familiar to them. Hence so many systems, in which we may so easily read the favourite occupations of their authors. Epicurus, exhausted by voluptuousness, framed the world and his atoms without the idea of a Providence, out of his own apathy; the geometrician forms it with his compasses; the chemist compounds it of salts; the mineralogist extracts it from the fire; and those who apply themselves to nothing, and their number is not inconsiderable, suppose it, like themselves, to be in a state of chaos, and moving at random. Thus, the corruption of the heart is the original source of our errors. Afterwards, the sciences, employing, in the investigation of natural objects, definitions, principles, methods, accompanied with a vast geometrical apparatus, seem, by this pretended order, to reduce to order what widely deviates from it. But supposing this order to exist, in the manner they present it to us, of what use could it be to man? Would it be sufficient to restrain and to console the miserable? Alas! what interest will they take in that of a society which tramples them under foot, and, when it has left them nothing to hope from nature, abandons them to the laws of motion?

I now proceed to answer, one by one, the objections I formerly stated against Providence, founded on the disorders of the globe, of vegetables, of animals, of man, and on the nature of God himself.

Answer to the objections against Providence, founded on the disorders of the globe.

Though my ignorance of the means employed by nature in the government of the world, be greater than I am well able to express; it is, happily, only necessary for me to turn my eyes to a geographical chart, and to have read a little, to

be enabled to demonstrate, that those by which her operations are pretendedly explained to us, have no foundation in truth. It is from human insufficiency that all the objections levelled at the Divine Providence take their rise.

First, it appears to me no more natural to compose the uniform motion of the earth in its orbit, out of the two motions of projection and attraction, than to attribute to similar causes, that of a man walking on the earth. The centrifugal and centripetal forces seem, to me, no more to exist in the heavens, than the two circles denominated the equator and the zodiac. Ingenious as may be such hypotheses, they are scaffoldings only, invented by men of genius for rearing the fabric of science, but can no more assist us in penetrating into the sanctuary of nature, than those employed in the construction of our churches can introduce us into the sanctuary of religion. These combined forces are no more the moving principle of the course of the stars, than the circles of the spheres are their barriers. They are merely signs, which have at last usurped the place of the objects they were intended to represent, as is the case with every thing else that is of human establishment.

If a centrifugal force had swelled out the mountains of the globe, when it was in a state of fusion, there must have been mountains much more elevated than the Andes of Peru and Chili. That of Chimboraco, which is the highest of them, is only 3220 fathoms in height, or 3350, at most, for the sciences are not perfectly agreed even in matters of observation. This elevation, which is nearly the greatest that is known on the globe, is less perceptible on it, than the third part of a line would be on a globe of six feet diameter. Now a mass of melted metal presents, in proportion to its size, scoriae much more considerable. Look at the anfractuosities of a simple morsel of iron-drofs. What frightful swellings, then, must have been formed on a

globe of heterogeneous and fermenting materials, more than three thousand leagues in diameter? The moon, whose diameter is much less considerable, contains, according to Cassini, mountains three leagues high. But what would be the case, if, with the action of our heterogeneous mass of terrestrial materials all in fusion, we should suppose beside that of a centrifugal force, produced by the earth's motion round its axis? I imagine that this force must have been necessarily exerted upon its equator, and, instead of forming it into a globe, must have flattened it out in the heavens, like those large plates of glass which glass-blowers dilate with their breath.

Not only the diameter of the earth at the equator is no greater than under its meridians, but the mountains there are not more elevated than elsewhere. The famous Andes of Peru have not their commencement at the equator, but several degrees beyond it, towards the south; and, if you proceed along the coast of that country, you will find Chili and Magellan's land, stopping at the fifty-fifth degree of southern latitude, in the Terra del Fuego, where they present to the ocean a promontory of eternal ice, of a prodigious height. Through the whole extent of this immense track, they never open but at the Straights of Magellan, forming throughout, according to the testimony of Garcilafso de la Vega,* a rampart, fortified with pyramids of ice, inaccessible to man, to quadrupeds, and even to birds. The mountains of the Isthmus of Panama, on the contrary, which are nearly under the line, are so little elevated, in comparison with the Andes, that admiral Anson, who had coasted them all, relates, that, on his arriving at those heights, he experienced suffocating heats; because the air, says he, was not refreshed by the atmosphere of the lofty mountains of Chili and Peru. The highest mountains of

* History of the Incas, book i. chap. 3.

Asia are entirely out of the tropics. The chain, known by the names of Taurus and Imäus, commences, in Africa, at Mount Atlas, towards the thirtieth degree of northern latitude. It runs across all Africa, and all Asia, between the thirty-eighth and fortieth degree, having its summits, nearly through the whole of this immense extent, always covered with snow, a proof, as we shall hereafter demonstrate, of a very considerable elevation. Mount Ararat, which makes part of this chain, is perhaps more elevated than any mountain of the new world, if we may form a judgment, either from the time which it cost Tournefort and other travellers to ascend from its basis to the commencement of its snow, or, which is less arbitrary, from the distance at which it may be seen, which is, at least, six day's journey of a caravan. The Peak of Teneriff is visible forty leagues off. The Felices of Norway, called by some, the Alps of the north, are visible, at sea, fifty leagues; and, if we may believe an ingenious Swede, are three thousand fathoms high. The peaks of Spitzberghen, of New Zealand, of the Alps and the Pyrennees of Switzerland, and those on which ice is found all the year round, are exceedingly elevated, though most of them very remote from the equator. They do not even run in directions parallel to that circle, as must have been the case, on the supposition of the effect produced by the rotation of the globe; for, though the chain of Taurus, in the ancient continent, stretches from west to east, that of the Andes, in the new, runs from north to south. Other chains proceed in other directions. But if this centrifugal force had once the power of heaving up mountains, how is it that it is become so impotent, as not to be able, at present, to throw so much as a straw into the air? It ought not to leave a single detached body on the surface of the earth. They are affixed to it, I shall be told, by the centripetal force, or gravity. But if this last power actually draws

every body towards the earth, why have not the mountains too submitted to their universal law, when they were originally in their pretended state of fusion? I am at a loss to conceive what answer can be made to this two-fold objection.

The sea appears to me not more adapted to the formation of mountains, than the centrifugal force is. How can we imagine the possibility of its having ever been able to throw them out of its womb? Meanwhile it is beyond dispute, that marbles and calcareous stones, which are only pastes of madripores, and of shells amalgamated; that flints, which are concretions of these; that marles, which are a dissolution of them; and that all marine bodies, which are found in every part of both continents, have issued out of the sea. These substances serve as a basis to a great part of Europe; hills of very considerable height are composed of them, and they are found in many parts of both the old world and the new, at an equal degree of elevation. But the mode in which they were deposited cannot be explained by any of the actual movements of the ocean. In vain would we ascribe to this element revolutions from west to east; never will it have the power of raising any thing above its level. If certain parts of the Mediterranean are produced as instances, which the sea has actually left dry, it is no less certain that there is a much greater number on the same coasts which its waters have never abandoned. Hear what is said on the subject, by that judicious observer Maundrel, in his journey from Alleppo to Jerusalem, in 1669. " In the adriatic gulph, the light house of Arminium
" or Rimini is a league from the sea; while Ancona, built
" by the Syracusans, is still close to the shore. The arch
" of Trajan, which render its port more commodious for
" merchants, is situated immediately upon it. Beritta, the
" favourite spot of Augustus, who gave it the name of *Julia*
" *Felix*, preserves no remains of its antient beauty, except its
" situation on the brink of the sea, above which it is

“elevated no higher than is necessary to secure it against the overflowing of the element.”

The testimony of the most accurate travellers is conformable to that of this ingenious Englishman. His compatriot, Richard Pocock, who travelled into Egypt in 1737, with less taste indeed, but with still greater accuracy, attests that the Mediterranean has gained, to the full, as much ground as it has lost*. “Nothing more is necessary, says he “to produce a conviction of this, than to examine the coast; for you will see, under water, not only a variety of artificial productions, manufactured in the rock, but likewise the ruins of many edifices. About two miles from Alexandria are to be seen, under water, the ruins of an ancient Temple.” An anonymous English writer, in a work stored with excellent observations, describes several very ancient cities of the Archipelago, such as Samos, the ruins of which are upon the very borders of the sea. He thus speaks of Delos, which, as every one knows, is in the center of the Cyclades†. “We found nothing else, all along the coast, but the remains of superb edifices, which had never been completed, and the ruins of others, which have been destroyed. The sea appears to have gained on the isle of Delos; and the water being clear, and the weather calm, we had an opportunity of observing the remains of beautiful buildings in places, where now the fishes swim at their ease, and on which the small boats of these cantons row to get at the coast.” The ports of Marseilles, Carthage, Malta, Rhodes, Cadiz, &c. are still frequented by navigators, as they were in the remotest antiquity. The Mediterranean could not have sunk at any one point of its shores, without sinking at every other; for it is like water in a basin, which must always come to

* Travels into Egypt. Vol. i. page 4 and 30.

† Travels in France, Italy, and the islands of the Archipelago, in 1763. Vols. iv. Letter cxxvii, page 256.

its level. This reasoning may be extended to all the coasts of the ocean. If there are found, any where, tracts of land deserted, it is not because the sea retires, but because the earth is gaining ground. They are the effect of alluvions, occasioned frequently by the overflowing of rivers, and sometimes by the ill-advised labours of man. The encroachments of the sea on the land are equally local, and are owing to some earthquake, the effect of which can be extended to no great distance. As these reciprocal invasions of the two elements are particular, and frequently in opposition on the same coasts, which have in other respects constantly preserved their ancient level, it is impossible to deduce from them any general law for the movements of the ocean.

We shall presently examine, how so many marine fossils could have been extracted from its bed; and, I am vain enough to think that, falling in with respectable traditions, we shall have something to advance on this subject, not unworthy the attention of the reader. In the mean time, let us consider other mountains, such as those of the granite, which are the highest on the globe, and the formation of which has not been imputed to the sea, because they contain no deposit, to attest such transition. To account for the origin of these, the same naturalists employ another system. They suppose a primitive earth, whose height equalled that of the highest peaks of the Andes, mount Taurus, the Alps, &c. which remain, they conceive, as so many evidences of the existence of that primeval soil: they then employ snows, rains, winds, and I know not what beside, to lower this once elevated continent to a level with the brink of the sea; so that we inhabit only the bottom of this enormous quagmire. This idea has an imposing air; first, because it terrifies, and next; because it is conformable to the picture of apparent ruin, which the globe exhibits; but a simple question will overturn it in a

moment : What has become of the fragments and rocks of this tremendous riddance ?

If it be said, that they were thrown into the sea, we must suppose, prior to all levelling, or deprefion, the existence of the bed of the sea ; and its excavation would then present a variety of other difficulties. But admitting it for a moment : How comes it, that these ruins have not in part filled up its bed, and that the sea has not overflowed ? How happens it, on the contrary, that it should have deserted such immense tracks of land, as are sufficient to form the greatest part of two vast continents ? Our systems, therefore, are unable to account for the elevation of mountains of granite, by any kind of deprefion, because they know not how to dispose of the fragments ; nor for the formation of calcareous mountains, by the movements of the ocean, because, in its actual state, it is incapable of covering them. Besides, the idea of certain philosophers, who have considered the earth as a decaying edifice, is not an idea of yesterday. Baron Busbequius, in his curious and entertaining letters, mentions a similar opinion entertained by Polybius : “ Polybius,” says he, “ pretends to have proved that the entrance of the black sea, in process of time, would be choked by the banks of sand, and by the mud, which the Danube and the Boristhenes were constantly forcing into it, and that the sea, in consequence, would be rendered inaccessible, and its commerce entirely destroyed. The sea of Pontus,” adds our author, “ is, nevertheless, just as navigable, at this hour, as it was in the days of Polybius.*

Bays, gulphs, and mediterranean seas, are no more the effects of irruptions of the ocean into the land, than mountains are productions of the centrifugal motion. These pretended disorders, are necessary to the harmony of all the

* Letter L. page 131.

parts of the earth. Let us suppose, for example, that the straits of Gibraltar were closed, as, it has been said, was formerly the case, and that the Mediterranean existed no longer. What would become of so many rivers of Europe, Asia, and Africa, which are maintained by the vapours that ascend out of that sea, and which return their waters to it again, in a wonderful exactness of proportion; as the calculations of many ingenious men have demonstrated? The north winds, which now constantly refresh Egypt in summer, and which convey the exhalations of the Mediterranean as far as the mountains of Ethiopia, to supply the sources of the Nile, blowing, in this case, over a space destitute of water, would carry drought and barrenness over all the northern regions of Africa, and even into the interior of that continent. The southern parts of Europe would fare still worse; for the hot and parching winds of Africa, which load themselves with so many rainy clouds, as they cross the Mediterranean, blowing, over the dry bed of that sea, without tempering the heat by humidity of any kind, would blast with scorching sterility, all that vast region of Europe, which extends from the straits of Gibraltar to the Euxine sea, and would utterly dry up all the countries through which flow, at present, a multitude of rivers, such as the Rhone, the Po, the Danube, &c. Beside, it is not sufficient to suppose, that the ocean opened for itself a passage into the bed of the Mediterranean, as a river spreads over a meadow country, after having overflowed its banks; it must farther be supposed, that the track of land inundated, was lower than the ocean, a phenomenon not to be met with in any part of the *terra firma*, the whole of which is above the level of the sea, those parts excepted, which have been wrested from the waters by human industry, as is the case in Holland. It must still farther be supposed, that a lateral sinking of the earth, must have taken place all round the basin of the Mediterranean, to regulate the

circuits, declivities, canals, and windings of so many rivers, which come from such a distance, to empty themselves into it; and that this sinking must have been effected with admirable proportions: for those rivers issuing, in many cases, from one and the same mountain, arrive, by the same declivities, to distances widely different, without their channels ceasing to be full, or their waters flowing too fast or too slow, notwithstanding the difference of their courses and levels. It is not, then, to an irruption of the ocean, that we are to ascribe the Mediterranean, but to an excavation of the globe, more than twelve hundred leagues long, and above eight hundred broad, which has been executed with dispositions so happy, and so favourable to the circulation of so many lateral rivers, that, if time permitted me to trace the course of any single one, it would be evident, how destitute of all foundation the supposition is, which I am combating.

Earthquakes, indeed, produce excavations; but such excavations are of small extent, and, far from forming channels for rivers, absorb the course of rivulets, and sometimes change them into pools, or marshes. These hypotheses may be applied to all gulphs, bays, great lakes, and mediterranean seas whatsoever, and we shall find that if such interior waters did not exist, not a fountain would remain in the greatest part of the habitable globe.

If we would form a just idea of the order of nature, we must totally forget the circumscribed and petty ideas of human order. We must renounce the plans of our architecture, which frequently employ straight lines, that the weakness of our sight may be enabled to take in the whole extent of our domain at a single glance; which symmetrizes all our distributions, and, in constructing our houses, places wings to the right, and wings to the left, that all the parts of our habitation may be comprehended in a single view, while

we occupy the centre of it; and which levels, fits to the plummet, smooths and polishes the stones, that the monuments we raise may be pleasant, both to the eye and to the touch. The harmonies of nature are not those of a Sybarite, but the accommodation and convenience of her numerous offspring, of mankind at large, and all beings that exist. When nature raises a rock, she introduces clefts, inequalities, points, perforations. She hollows and roughens it with the chisel of time and of the elements; she plants herbs and trees upon it; she stores it with animals, and places it in the bosom of the sea, in the very focus of storms and tempests, that it may there afford an asylum to the inhabitants of the air and the waters.

In like manner, when she scooped out basons for the seas, she neither rounded the borders, nor applied the line to them; but contrived deep bays, sheltered from the general currents of the ocean, that, during tempestuous weather, the rivers might disembody themselves in security; that the finny legions might resort thither for refuge, at all seasons; might there lick up the alluvion of the earth, carried down by the fresh water; might come thither to spawn, and be able to ascend, as many of them do, to the very shallows of the rivers, in search both of food and shelter for their young. And it is for the preservation of these arrangements, that nature has fortified every shore with long banks of sand, with shelves, and with enormous rocks and islands, which are placed at proper distances, to protect them from the fury of the ocean.

She has employed similar dispositions as to the beds of rivers, of which we shall say something in the course of this study, though we have room only just to glance at this subject, new as it is, and, at the same time, so fertile in observations. Accordingly, she has made the currents of rivers to flow, not in a straight line, as they must have run, had the laws of hydraulics been observed, because

of the tendency of their motions towards a single point ; on the contrary, they are made to travel many a winding way, through the bosom of the land, before they pour themselves into the sea. To regulate the course of these rivers, and to accelerate or retard it, conformably to the level of the countries through which they pass, she pours into them lateral rivers, which, in a flat country, where they form an acute angle with the source of the main river, increases its speed, and in a mountainous country, by forming with it a right, and sometimes an obtuse angle, diminishes its speed. These laws are so infallible, that a judgment may be formed, simply from the map, whether the rivers, which water any country, are slow or rapid, and whether that country is flat or elevated, by the angle which the confluent rivers form with their courses. Thus, most of those which throw themselves into the Rhone, form right angles with its rapid stream, to check its impetuosity. Some of these confluent rivers, are real dykes, which cross the main river, from side to side, in such a manner, that the river crossed, which was running very rapidly above the confluence, flows below it very gently. This observation will be found to apply to many of the rivers of America, and especially to the Méchafissippi. From these simple perceptions, which I have at present only time to indicate, it may be concluded, that it is easy to retard or accelerate the source of a river, by simply changing the angle of incidence of its confluent rivers. I mention this, not in the way of advice, as a thing that it would be wise to practice, but as a very curious speculation ; for it is always dangerous for man to interfere with and derange the plans of nature.

The rivers, on throwing themselves into the sea, produce in their turn, by the direction of their mouths, an effect either of acceleration, or retardation, on the course of the tides. But I will not launch farther into the study of these grand and sublime harmonies. Enough has, perhaps, been

said, to evince the truth of my position, that the bed of the seas was scooped out for the purpose of receiving their waters ; and I must be satisfied.

There is one argument more, however, which I cannot help adducing, and which is calculated to remove every possibility of doubt upon the subject. Had the bed of the seas been formed, as is supposed, by a sinking down of the solid parts of the globe, the shores of the sea, under water, would have the same declivities with the adjoining continent. Now this is no where found to be the case, look at what coast we will. The declivity of the bason of the sea is much steeper than that of the bounding lands, and by no means a prolongation of it. Paris, for example, is raised above the level of the sea about 26 fathoms, reckoning from the base of the bridge of Notre Dame. The Seine, accordingly, from this point to where it empties itself into the sea, has no greater declivity than 130 feet, in a distance of forty leagues ; whereas, measure from the mouth of the river, towards the main ocean, the short distance of a league and a half only, and you will find, at once, an inclination of from 60 to 80 fathoms ; for this is the depth at which vessels anchor in the road of Havre de Grace.

These differences of level at land, from the level of the bed of the sea, in the same line of direction, are to be met with on all coasts, more or less. The English Dampier has indeed, observed, that seas, where the coasts are steep, have considerable depth, and that along flat shores their depth is small ; but this striking difference is universally observable, that, along flat coasts the bed of the sea is much more inclined than the soil of the adjoining continent, and that, along high lands, sometimes no bottom is to be found. This clearly demonstrates, therefore, that the beds of the seas were hollowed out expressly to contain their waters. The declivity of their excavations has been regulated by laws infinitely wise ; for if it were no greater than that of the

adjacent lands, the billows of the sea, whenever the wind blew towards the shore, however lightly, would considerably encroach on the land. This actually happens in the case of storms and extraordinary tides : the waves overflow their usual bounds, and meeting a declivity flat and gentle, compared to that of their bed, sometimes inundate the land to the distance of several leagues. This has often taken place in the island of Formosa, the natural ramparts of which, such as the manglier, the inhabitants, it is probable, formerly destroyed. Holland, for nearly a similar reason, is exposed to inundations, because it has encroached on the very bed of the sea. It is principally on the shores of the ocean that the invisible boundary is fixed which the author of nature has prescribed to its waves. It is there you perceive that you are at the intersection of two different planes, of which one terminates the declivity of the land, and the other commences that of the sea.

It cannot be said, that it was by the currents of the sea the bed was hollowed out ; for in that case, where could the earth that filled it before be deposited ? These currents could raise nothing above their own level. Nor can it even be said, that the channels of rivers have been excavated by the current of their own streams, for there are several which have found a subterraneous passage through masses of solid rock, so hard and so thick, as to bid defiance to the pick-axes and the mattocks of our labourers. Beside, on the supposition we are combating, these rivers must have formed, at the places where they fall into the ocean, banks of sand, and accumulations of earthy substances, of a magnitude proportional to the quantity of ground which they must have cleared away in forming their channels ; whereas most of them, on the contrary, as we have already observed, empty themselves at the bottom of bays, hollowed for the express purpose of receiving them. How is it that they have not completely filled up these bays, if they are incessantly pouring

down into them substances, separated from the land? Why is not the bed of the very ocean itself choked up, from the constant accumulation of the spoils of vegetables, sands, rocks, and the wreck of earth, which, on every shower that falls, renders muddy and yellow, the rivers which fall into it? The waters of the ocean have not risen so much as an inch, since man first began to make his observations, as might easily be demonstrated, from the state of the most ancient sea ports of the globe, which are still, for the most part, at the same level. I have not time to speak here of the means employed by nature for the construction, the support and purification of this immense bason; if I had, they would be found to suggest new subjects of admiration. Enough has been said to shew, that what in nature may appear to us the effect of ruin or chance, is, in many cases, the result of the most profound intelligence. Not only, there is not a hair that falls from our head, nor a sparrow from heaven, but a pebble does not roll on the shore of the ocean, without the permission of God, according to that sublime expression of Job: "He setteth an end to darkness, and searcheth out all perfection, the stones of darkness and the shadow of death.*" He likewise knows the moment when that pebble, buried in darkness, must spring into light, to serve as a monument to nations.

Independent of the numerous geographical proofs, demonstrating that the ocean, by its irruptions, has not hollowed out a single bay on the face of the globe, nor detached any one part of the continent from the rest, there are others which may be deduced from vegetables, from animals, and from men. This is not the place to dwell upon the subject; but I shall quote, as I go, an observation from the vegetable world, which proves, for example, that the island of Great

* Job xxviii. 3.

Britain, was never united to the European continent, as many have supposed, but must have been separated from the beginning, by the channel. It is a remark of Cæsar's, in his commentaries, that during his stay in that island, he had never seen either the beech tree, or the fir, though these trees were very common in Gaul, along the banks both of the Seine and of the Rhine. Now, if these rivers had ever flowed through any part of Britain, they must have carried with them the seeds of the vegetables, which grew at their sources, or upon their banks. The beech, and the fir, which, now, are found to thrive in that island, must, of necessity, had it ever been a part of the continent, have existed there in the time of Cæsar, especially as they would not have changed their latitude, and are, beside, as we shall see in the proper place, of the genus of fluviatic trees, the seeds of which resow themselves, by means of the waters. Beside, from whence could the Seine, the Rhine, the Thames, and so many other rivers, the currents of which are supplied from the exhalations of the channel, from whence, I say, could they have been fed with water? The Thames would then have flowed through France, and the Seine through England; or rather, to speak more properly, the countries now watered by these rivers, would have been completely dry.

It is by our geographical charts, as by most other instruments of science, that we are misled upon this subject. Observing in our maps, so many retreadings and projections along the coasts of the continent, we have been led to imagine, that these irregularities must have been occasioned by violent currents of the sea. But we have just shown, that they were not thus produced; and we now proceed to prove, that it could not possibly have been the case.

Dampier, who is not the first navigator that sailed round the globe, but who is the one, in my opinion, that has made the best observations, says, in his excellent

Treatise on Winds and Tides : * " Bays scarcely have any currents, or if they have, they are only counter-currents, running from one point to another." He quotes many observations in proof of this ; and remarks of a similar nature are found scattered through the journals of other navigators. Though he has treated only of the currents between the tropics, and even as to these has expressed himself with some degree of obscurity, we shall proceed to generalize the principle, and to apply it to the chief bays of continents.

I reduce the currents of the ocean to two general currents. They both proceed from the poles, and are produced, in my opinion, by the alternate fusion of their ices. This is not the place to examine the cause of it, but it appears to me so natural, so new, and a subject of such curious investigation, that the reader, I flatter myself, will not be sorry if I digress a moment, to give him an idea of it.

The poles appear to me to be the sources of the sea, as the icy mountains are the sources of the principal rivers. If I am not mistaken, it is by the snow and the ice with which the north pole is covered, that are annually renovated the waters of the sea comprehended between the continent of Europe and that of America, the projecting and retreating parts of which have, beside, a mutual correspondence, like the banks of a river.

By looking at a map of the world, we may observe that the bed of the Atlantic ocean becomes narrower and narrower towards the north, and widens towards the south ; and that the prominent part of Africa corresponds to that great retreating part of America, at the bottom of which the gulf of Mexico is situated, as the prominent part of South America corresponds to the vast gulph of Guinea ; so that this bason has, in its configuration, the proportions, the sinu-

* Vol. ii. page 385.

osities, the source, and the mouth of a vast fluviatic channel. Let us next observe, that the ices and snows form, in the month of January, on our hemisphere, a cupola, the arch of which extends more than two thousand leagues over the two continents, with a thickness of some lines in Spain, of some inches in France, of some feet in Germany, of some fathoms in Russia, and beyond the sixtieth degree of latitude of several hundreds of feet, such as the ices which Ellis,* and other navigators of the north, encountered at sea, even in the midst of summer, and of which some, if Ellis may be credited, were from fifteen to eighteen hundred feet above its level; for their elevation must probably go on increasing up to the very pole, in conformity to the proportions observable in those which cover the summits of our icy mountains, and which must give them, at the pole itself, a height which it is not possible to ascertain.

We may perceive from this simple outline, what an enormous aggregation of water is fixed by the cold of winter, in our hemisphere, above the level of the ocean. The quantity, indeed, is so great, that I think myself warranted in ascribing to the periodical fusion of this ice, the general movement of our ocean, and that of its tides. And the same application may be made of the fusion of the ices of the south pole, which are there still more enormous, to the movements of the southern ocean.

Hitherto no conclusion whatever has been drawn, relatively to the movements of the sea, from these two masses of ice, considerable as they are, which are accumulated at the two poles of the world. They must, however, necessarily occasion a very perceptible augmentation of its water, on their return to it, by the action of the sun, which dissolves them in part every year; and a diminution, equally great, on being withdrawn, by the effect of the evaporations, which

* Ellis's Voyage to Hudson's Bay.

reduce them again to ice at the poles, when the sun retires. I dare affirm, that the observations I have to make upon this subject will be in a high degree interesting; and, to the judgment of those readers who have thrown off the trammels of system and party, I leave the decision. I shall endeavour to abridge them to the utmost of my power, and shall flatter myself with the hope of forgiveness, at least, in consideration of their novelty. My task is a singular one: the general movements of the seas have been hitherto ascribed to gravitation, or to the attraction of the sun and moon on the equator; whereas I am about to deduce them from the simple effusions of the polar ices.

It is impossible to deny, in the first place, that the currents and tides, in the vicinity of the polar circle, come from the pole.

Frederic Martens, who, in his voyage to Spitzbergen, in 1671, advanced as far as to the eighty-first degree of northern latitude, positively asserts, that the currents amidst the ices ran toward the south. He adds, too, that as to the flux and reflux of the tides, he can affirm nothing with certainty respecting them. Let this be carefully remarked.

Ellis observed, with astonishment, in his voyage to Hudson's Bay, in 1746 and 1747, that the tides there came from the north, and that they were accelerated, instead of being retarded, in proportion as the latitude increased. He assures us, that these effects, so contrary to the effects observable on our coasts, where the currents come from the south, demonstrate that the tides, in those high latitudes, do not proceed either from the line, or from the Atlantic Ocean. He ascribes them to a pretended communication between Hudson's Bay and the South Sea: a communication which he sought for, with great ardour, for it was, indeed, the object of his voyage, but which now we have complete assurance does not exist, from the fruitless attempts made, in his last voyage, by Captain Cook, to find it by the

South Sea, to the north of California, agreeably to the advice long before given respecting it by the illustrious Dampier, whose sagacity and observations have greatly assisted Captain Cook in all his discoveries.

Ellis farther observed, that the course of these northern tides of America, was so violent at Wager's Strait, which is about $65^{\circ} 37'$ north latitude, that it flowed at the rate of from eight to ten leagues an hour. He compares it to the sluice of a mill. He remarked, that the surface of the water was fresh, which puzzled him exceedingly, by damping the hope he had formed, of a communication between this bay and the South Sea. He was still, however, convinced of the existence of such a passage: so great is the pertinacity of man in favour of preconceived opinions, in the very face of evidence itself!

John Huguez de Linschotten,* a Dutchman, had made nearly the same remarks on the course of the northern tides of Europe, when he was at Waigat's Strait, at $70^{\circ} 20'$ north latitude. In the two voyages which this accurate observer made to this strait, in 1594 and 1595, undertaken with the view of discovering a passage to China by the north of Europe, the same observations are repeated: "We observed," says he, "once more, from the course of the tide, what we had already remarked with much exactness, that it comes from the east." He likewise remarked, that the water there was brackish, or half salt; this he ascribes to the fusion of a prodigious quantity of floating ice, which stopped his passage at Waigat's Strait; for the ice formed even of sea-water is fresh. But Linschotten draws no conclusion, any more than Ellis, from these tides of water half fresh, which descend from the north; and, full of his object, like the English navigator, ascribes them to a sea, which he supposes open to the east, beyond

* See the first and second voyage to Waigat's Strait, by H. I. Linschotten. Voyages to the North, vol. iv. page 204.

Waigat's Strait, through which he was desirous of finding his way to China.

His countryman, the unfortunate William Barends,* who made the same voyages, in the same fleet, but in another vessel, and who ended his days on the northern coasts of Nova Zembla, where he had wintered, found, to the north and to the south of that island, a perpetual current of ice, setting in from the east with a rapidity, which he compares, like Ellis, to a sluice. Some of those ices were of the thickness of 36 fathoms under water, and 16 fathoms above the surface. This was at Waigat's Strait, in the months of July and August. He found there some Russian fishermen, from Petzorah, who navigated these seas, covered as they are with floating rocks of ice, in a boat made of the barks of trees, sewed together. These poor people made presents of fat geese to the Dutch mariners, with strong demonstrations of kindness; for calamity, in all climates, has a powerful tendency to conciliate affection between man and man. They informed him, that this same Strait of Waigat's, which was then disgorging such immense quantities of ice, would be entirely shut up towards the end of October, and that it would be possible to go into Tartary over the ice, by what they called the sea of Marmara.

It is incontrovertible, that all the effects which I have been relating, can proceed only from the effusions of the ices which surround the pole. I shall here remark, by the way, that those ices, which flow with such rapidity to the north of America and of Europe, towards the months of July and August, greatly contribute to our high equinoctial tides, in September; and that it is in the month of October, when their effusions are stopped, like those of Waigat's, that our tides begin to diminish.

* See the second and third voyages of the Dutch, by the north, in the first volume of the Voyages of the East India Company.

I shall here, perhaps, be asked, why, to the north of America and of Europe, the tides should proceed from the north and the east, while, on our own coasts, and on those of America which are under the same latitudes, they come from the south?—Instead of answering this question, I might satisfy myself with having said enough to demonstrate, that all the tides do not arise from the pressure or attraction of the sun and moon on the equator; and, consequently, with having proved the imperfection of our scientific systems, which ascribe them to these causes: but I proceed to repair what I have been pulling down, by other observations, and to demonstrate, that there is no one tide, on any coast whatever, but what owes its origin to polar effusions.

An observation of Dampier's* will serve, at first, as a basis to my reasonings. This ingenious observer distinguishes between currents and tides. He lays it down as a principle, founded on a variety of experiments, which he relates, that "tides are generally felt near the shore, and currents at a remote distance." This being established, the polar effusions, which are the tides of the north and of the east, to those who are in the vicinity of the pole or of bays which have a communication with it, take their general course to the middle of the channel of the Atlantic ocean, attracted towards the line by the diminution of the waters, which the sun is there incessantly evaporating. They produce, by their general current, two contrary currents, or collateral whirlpools, similar to those which rivers produce on their borders,

I am not taking for granted, without any foundation, the existence of these counter currents, or whirlpools, like the generality of your system makers, who create new causes, in proportion as nature presents them with new effects. These vortices are hydraulic re-actions, the laws of which

* See his Treatise on Winds and Tides.

geometry explains, and the reality of which may be ascertained by experience. If you look at a small running brook, you will frequently see the straws that float along its borders, carried up in a direction contrary to the general current of the stream, and on arriving at the point, where the counter currents cross the general current, you will observe them turning and spinning round for a considerable time, agitated by those two opposing powers, till they are at last carried down the main stream. These counter currents are still more perceptible, if the rivulet flows through a bason, which has itself no flux; for the reaction is, in that case, so considerable round the whole circumference of the bason, that the counter currents carry about all bodies that are floating in it, to the very place where the rivulet disengages itself.

These lateral counter currents are so perceptible on the borders of rivers, that the watermen frequently take advantage of them, to make their way in the direction opposite to the general course. On the borders of lakes they are still more striking. Father Charlevoix, to whom we are indebted for many judicious observations respecting Canada, informs us, that when he embarked on lake Michigan, he advanced eight good leagues a day, by the assistance of those lateral counter currents, though the wind was contrary. He supposes, and with good reason, that the rivers which throw themselves into this lake, produce, in the middle of its waters, strong contrary currents: "But these strong currents," says he, "are perceptible only in the middle of the channel, and produce on the borders, vortices, or counter currents, which are of great advantage in coasting along the shore, as those persons are obliged to do, who sail in canoes made of bark."

* See his History of New France. Vol. vi. Page 2.

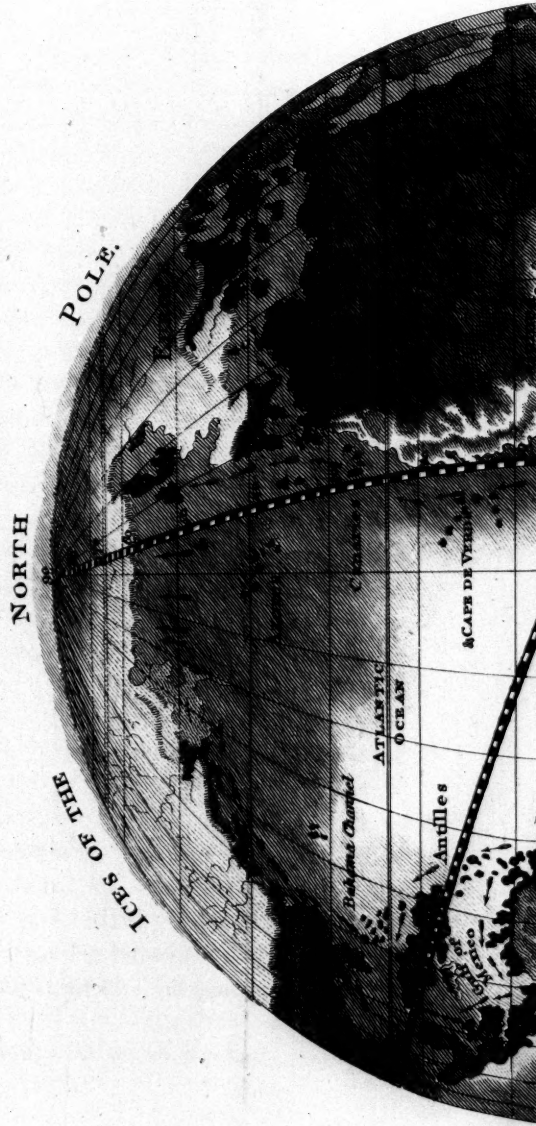
Dampier's work abounds with observations on the counter-currents of the ocean, which are very common, especially in the straits of islands situated between the tropics. He speaks frequently of the extraordinary effects produced by their junction, in opposite directions, with the particular currents which occasion them; but as he does not consider the tides themselves as vortices of the general current of the Atlantic Ocean, and as he did not, I believe, so much as suspect the existence of its general current, though he has thoroughly investigated the two currents, or monsoons of the Indian Ocean, I shall proceed to adduce certain facts, which establish the most perfect conformity between the Atlantic current and those which he himself observed in the Indian Ocean, and in the South Sea. These facts will moreover prove to a demonstration, the existence of the polar effusions in question: for, universally, wherever these effusions, in their progress southward, happen to meet their own counter currents, which are setting in towards the north, they produce, by the collision, tides the most tremendous, and which have directions diametrically opposite to each other. Let us consider them only at their point of departure to the north of Europe, where they begin to leave our coasts, and to stretch out into the open sea. Pontoppidan says, in his history of Norway, that there is above Berghen a place called *Malestrom*, very formidable to mariners, where the sea forms a prodigious whirlpool of several miles diameter, in which a great many vessels have been swallowed up. James Beverell* says positively, that there are in the Orkney Islands two opposite tides, the one running from the north west, and the other from the south east; that they dash their roaring billows to the very clouds, and convert the separating strait into an enormous mass of

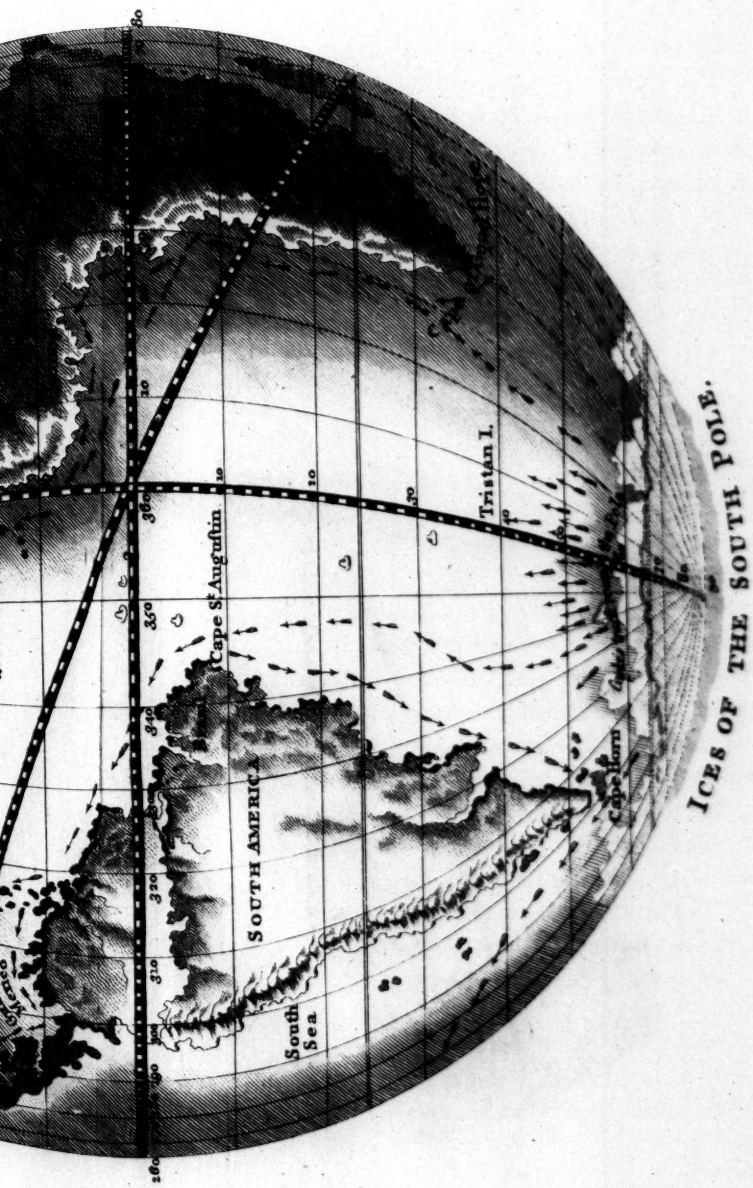
* See his Beauties of Scotland. vol. vii. page 1405.

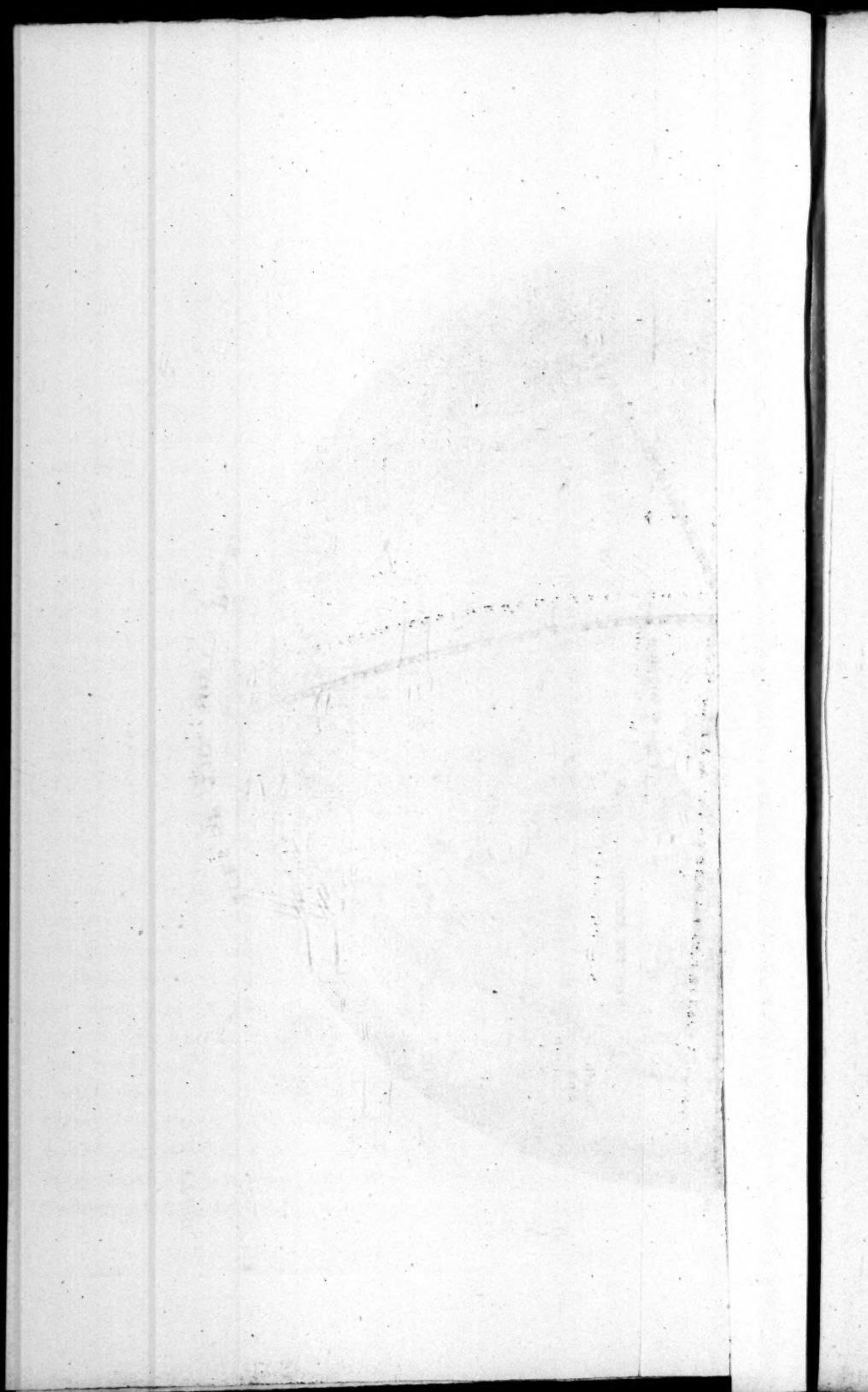
PLATE II.

ATLANTIC HEMISPHERE.

with its Channel the Ices its Currents & its Tides in the Months of January & February.







foam. The Orkneys are situated a little below the latitude of Berghen and in the prolongation of the northern coast of Norway, that is to say, at the confluence of the polar effusions, and of their counter currents.

Other islands of the sea are in similar positions, as, if we had room, might easily be proved. The channel of Bahama, for example, which runs with so much rapidity to the north, between the continent of America and the Lucayo Islands, produces, round those islands, by its encountering the general current of the sea, tides equally tumultuous with those of the Orkneys.

These counter currents to the course of the Atlantic Ocean produce, then, our European and American tides, which set in to the north, on the coast of Europe, while its general current runs southward, at least during summer. I could adduce a thousand other observations respecting the existence of these contrary currents; but a single one, more general than those which I have cited, will be sufficient for my purpose, both from its importance and its authenticity, being the first which has been made in Europe, and perhaps the only one: it is that of Christopher Columbus, setting out on the discovery of the new world. He sailed from the Canaries about the beginning of September, steering to the west. During the first days of his voyage, he found that the currents carried him to the north east. When advanced two or three hundred leagues from land, he perceived that their direction was to the south. This contrariety terrified his companions, who believed the sea to be now driving to a precipice. Finally, as he approached the Lucayo Islands, he again found the currents setting in northward. The journal of this voyage may be seen in Herreira.

I conceive that this general current, which flows from our pole in summer with so much rapidity, and which, according to the experience of Ellis and Linschotten, is so violent

towards its source, must cross the equinoctial line, in as much as its flux is not stemmed by the effusions of the south pole, which, at that season, are consolidated into ice. I presume, for the same reason, that it extends beyond the Cape of Good Hope, from whence it is directed toward the torrid zone, to which it is attracted by the diminution of the waters, which the sun is there incessantly pumping up; and that, being directed eastward by the position of Africa and Asia, it forces the Indian Ocean into the same direction, contrary to its usual motion. I consider it, therefore, as the prime mover of the westerly monsoon, which takes place in the seas of India, in the month of April, and does not end till the month of September.

I am likewise of opinion, that the general current which issues, during our winter, from the south pole, at that time heated by the rays of the sun, restores the Indian ocean to its natural motion westward, and that it is aided in this by the general impulse of the easterly winds, which usually blow in the torrid zone, when nothing deranges their course. I, farther, presume, that this current, in its turn, penetrates into our Atlantic Ocean, directs its motion northward by the position of America, and produces various other changes in our tides. In fact, Froger says, that, in Brazil, the currents follow the sun; that when the sun is in the south, they run southward, and when to the north, northward. Those who have had experience of these effusions of the south pole, beyond Cape Horn, have found, that, in the summer of the southern hemisphere, the tides set in northward, as was observed by William Schouten, who, in January 1661, discovered Maire's Strait. But those, on the contrary, who have gone thither in the winter of those regions, have found that the tides ran to the south, and came from the north, as was observed by Frazer in the month of May, 1712.

Now it appears to me, that, from these polar effusions, we may explain the principal phenomena of our own tides. It

will be evident, for example, why those of the evening should be stronger, in summer, than those of the morning; because the sun acts more powerfully by day than by night, on the ices of our pole, which are under our meridian. This effect resembles the intermittance of certain fountains, supplied by the ice of mountains, which flow more copiously in the evening than in the morning. It will also be evident how it happens that our morning tides, in winter, rise higher than those of the evening, and why the order of our tides changes, at the end of every six months, (as Bouguer* has justly remarked, who was astonished at the fact, though he assigns no reason for it), because the sun being alternately towards both poles, the effects of the tides must necessarily be opposite, like the causes which produce them.

But there are relations between the ocean and the poles, still more extensive and striking.—At the solstices, the tides are lower than at any other season of the year; and these also are the seasons, when there is most ice on the two poles, and, consequently, least water in the sea. The reason is obvious. The winter solstice, with respect to us, is the season of the greatest cold; there is, accordingly, at that time, on our pole, and on our hemisphere, the greatest possible accumulation of ice. At the south pole, indeed, it is the summer solstice; but there is little ice melted on this pole, because the action of the greatest heat is not felt there, as with us, but when the earth has an acquired heat, super-added to the actual heat of the sun, which takes place only in the six weeks that follow the summer solstice, and this likewise, in our summer, is the hottest season of the year, which we call the dog days.—At the equinoxes, on the contrary, we have the highest tides. And these are

* Bouguer's Treatise of Navigation, page 153.

precisely the seasons when there is the least ice at the two poles, and, of course, the greatest mass of water in the ocean. At our autumnal equinox, in September, the greater part of the ices of the north pole, which has been exposed to all the heats of summer, is melted, and those of the south pole begin to dissolve. It is farther remarkable, that the tides at our vernal equinox, in March, rise higher than those of September, because it is the end of summer to the south pole, which contains much more ice than ours, and, consequently, sends to the ocean, a much greater mass of water. The reason of its containing more ice is, because the sun is six days less in that hemisphere than in ours. If I am asked here, why the sun does not communicate his light and heat, in equal proportions, to both poles? I shall leave it to the learned to assign what they call the cause: and shall be contented myself with ascribing it to the divine goodness, which has been pleased to bestow the largest share of these blessings, on that half of the globe which contains the greatest quantity of dry land, and the greatest number of inhabitants.

I shall say nothing of the intermittance of these polar effusions, which produce, on our coasts, two fluxes and two refluxes, nearly in the same time that the sun, making the circuit of the globe, over our hemisphere, alternately heats two continents and two oceans, that is, in the space of twenty four hours, during which his influence twice acts and is twice suspended. Neither shall I speak of their retardation, which is nearly three quarters of an hour from tide to tide, and which seems to be regulated by the different diameters of the polar cupola of ice, the extremities of which, melted by the sun, diminish and retire from us every day, and the effusions of which must, consequently, require more time to reach the line, and to return again from the line to us. Neither shall I dwell on the other relations which these polar periods have to the phases of the moon, especially when she is at the full; for her rays possess an evaporating heat, as

the late experiments, made at Rome and at Paris, have demonstrated: for this would lay me under the necessity of detailing a series of observations and facts, which might carry me too far.

Still less shall I involve myself in a discussion respecting the tides of the south pole, which, in the summer of that pole, in the open sea, come in vast surges, immediately from the south and south west, as the Dutch navigator, Abel Tasman, experienced in the months of January and February, 1692; or respecting their irregularity on the coasts of that hemisphere, such as those on the coast of New Holland, where Dampier, in the month of January 1688, found, to his great astonishment, that the highest tide, which set in from east quarter north, did not arrive till three days after full moon, and where his ship's company, struck with consternation, were for several days together, under the apprehension that their vessel, which they had hauled upon the beach to be refitted, could never be got afloat again.* I shall say nothing of those of New Guinea, where, towards the end of April, the same navigator experienced several, on the contrary, in the space of a single night, which extended, in direct opposition to ours, from north to south, and came from the west in very rapid and tumultuous swells, preceded by enormous surges, which did not break; nor of the inconsiderable elevation of those tides on the coast of Brazil, and in most of the islands of the south sea, and of the East Indies, where they rise only to 5, 6, and 7 feet, whereas, Ellis found them, at the entrance of Hudson's Bay, 25 feet high, and the chevalier Narbrough, at the entrance of Magellan's straits, 20 feet.

Their course towards the equator in the south sea, their retardations and accelerations on the shores, their directions sometimes eastward, and sometimes westward, according to

* Dampier's voyages: Treatise on winds and tides, pages 376 & 379.

the monsoons, and finally, their rise, which increases in proportion as we approach the pole, and diminishes in proportion to our distance from it, even between the tropics, demonstrate, that their focus is not under the line. The cause of their motions depends, not on the attraction, or the pressure, of the sun and moon, on that part of the ocean; for these forces would, undoubtedly, act there with the greatest energy, and in periods as regular as the course of these two luminaries; but it seems to depend entirely on the combined heat of these same luminaries, on the poles of the globe, the irregular effusions of which, not being narrowed in the southern hemisphere, as in ours, by the channel of two adjacent continents, produce, on the shores of the Indian Ocean and South Sea, expansions vague and intermitting.

We have only, then, to admit these alternate effusions of the polar ices, which it is impossible to call in question, in order to explain, with the greatest facility, all the phenomena of the tides and currents of the ocean. These phenomena present, in the journals of the most enlightened navigators, a perpetual obscurity, and a multitude of contradictions, whenever they persist in ascribing the causes of them to the constant pressure of the moon and sun on the equator, without paying attention to the alternate currents from the poles, which direct their course to that same equator; or to their counter currents, which, returning towards the poles, produce tides; or to the revolutions which winter and summer effect on these two movements.

It has been supposed, indeed, in modern times, that the sea must be clear of ice under the poles, from the groundless idea, that the sea freezes only along the shore; but this supposition is the mere creature of your closet philosophers, and is in direct contradiction to the experience of the most celebrated navigators. The efforts of Captain Cook, towards the south pole, demonstrate its erroneousness. That intrepid

mariner, even in the month of February, which is the season of the dog days in that hemisphere, could never approach nearer the pole, where there is no land, than the seventieth degree of latitude, that is, no nearer than five hundred leagues, though he had coasted round its cupola of ice for a whole summer: this distance, besides did not compose half the magnitude of the cupola, for he was permitted to advance so far only under favour of a bay, opened in a part of its circumference, which every where else was of much greater extent.

These bays, or openings, are formed in the ice merely by the influence of the nearest adjacent lands, where nature has distributed sandy zones to assist, at the proper season, in accelerating the fusion of the polar ices. Such are,—to mention one or two only as I pass, for I have not time to develop all the plans of this wonderful architecture—such, I say, are those long belts of sand which encompass South America, in Magellan's Land, and those of Tartary, which commence in Africa, at Zara, or the desert, and proceed forward, till they terminate in the north of Asia. The winds, in summer, bear away towards the poles the igneous particles, with which those zones are filled, and the action of the sun upon the ices is thereby accelerated.

It is easy to conceive, independent of experience, that the sands, by the reflections of their specular and brilliant parts, must multiply the heat of the sun, and preserve it a long time in their interstices. It is certain, at least, that the greatest openings in the polar ices are always to be found in the direction of the warm winds, and under the influence of these sandy tracts of land, as, if this were the proper place, I should find no difficulty in demonstrating. But we may see examples of it, without quitting our own continent, nay, even in our very gardens. In Russia, the rivers and lakes always begin to thaw at the banks, and the fusion of their ices is accelerated, in proportion as the strand is

more or less gravelly, and as they meet, relatively to the strand, in the direction of the south wind. The same effects, towards the close of winter, are observable in our gardens. The ice which covers the gravel in the alleys, melts first; afterwards that which is on the soil, and last of all, that which is in the basons. The fusion of this, too, begins at the brink, and the length of time necessary to complete it, is in proportion to the extent of the bason; so that the central part of the ice, or that which is farthest from the earth, is, likewise, the last that is dissolved.

There can remain, therefore, not the slightest shadow of doubt, that the poles are covered with a cupola of ice, agreeably to the experience of navigators, and the dictates of natural reason. We have taken a glance of the icy dome of our own pole, which covers it, in winter, to an extent of more than two thousand leagues over the continents. It is not so easy to determine its elevation at the centre, and under the pole itself; but the height there must be immense.

Astronomy sometimes presents in the heavens so vast an image of it, that the rotundity of the earth seems to be considerably affected by it.

There is a passage on this subject, in Childrey's *Natural History of England*,* which I shall take the liberty of quoting. This naturalist supposes, as I do, that the earth, at the poles, is covered with ice, to such a height, that its figure is thereby rendered sensibly oval. This he proves by two very curious astronomical observations. "What obliges me, beside," says he, "to embrace this paradox, is, that it serves to resolve admirably well, a difficulty of no small importance, which has greatly embarrassed Tycho Brhaé and Kepler, respecting central eclipses of the moon, which take place near the equator, as that for instance, which Tycho observed in the year 1588, and that

* Pages 246 and 247.

“ observed by Kepler, in the year 1624, of which he thus
 “ speaks : *Notandum est hanc lunæ eclipsim (instar illius quam*
 “ *Tycho, anno 1588, observavit totalem & proximam centrali)*
 “ *egregiè calculum sefellisse ; nam non solum mora totius lunæ*
 “ *in tenebris brevis fuit, sed et duratio reliqua multò magis ;*
 “ *perindè quasi tellus elliptica esset, demetientem breviorè*
 “ *habens sub æquatore, longiorè a polo uno ad alterum.*”

That is, “ It is worthy of remark, that this eclipse of the
 “ moon, (he is speaking of that of the 26th September,
 “ 1624), like the one which Tycho observed, in the year
 “ 1588, which was total, and very nearly central, deceived
 “ me extremely in my calculation ; for, not only was the
 “ duration of total darkness very short, but the rest of the
 “ duration was still shorter, as if the figure of the earth
 “ was elliptical, having the smaller diameter under the
 “ equator, and the greater from pole to pole.”

The detached masses, half melted, which are every year
 torn from the circumference of this cupola, and which are
 met with, floating at sea, at as great distance from the pole
 as the 55th degree of latitude, are so extremely lofty, that
 Ellis, Cook, Martens, and other navigators of the north,
 and of the south, the most accurate in their details, represent
 them as equal at least, to a ship under sail : nay Ellis, as we
 have already mentioned, does not hesitate to assign to them
 an elevation of from 1500 to 1800 feet ; and they all agree
 in affirming, that those fragments emit coruscations, which
 render them perceptible before they come to the horizon.
 I shall remark, by the way, that our *aurora borealis*
 may owe its origin to similar reflections from the
 polar ices, the elevation of which may, perhaps, one day
 be determined by the extent of those very lights.

Be this as it may, Denis, governor of Canada, speaking
 of the ices which descend every summer from the north,
 upon the great bank of Newfoundland, says, that they are
 higher than the turrets of Notre Dame, and that they may

be seen at the distance of from fifteen to eighteen leagues. Their cold is felt on shipboard at a similar distance. According to him, "they are sometimes found in such numbers, being all carried forward by the same wind, that vessels, making toward the land to fish, have fallen in with them, in a series of a hundred and fifty leagues, and upwards, in length, and which have coasted along their borders for one, and sometimes two, entire days, with a fresh breeze, and every sail set, without being able to reach the extremity, looking for an opening through which to pass; if they find one, they cross it, as through a strait; otherwise they must get on, till they have outsailed the whole chain, in order to make good their passage; for the way is throughout blocked up with ice. These ices do not melt till they meet the warm water, toward the south, or are forced by the wind on the land's side. Some of them run aground, in from 25 to 30 fathoms of water; judge then of their height, exclusive of what is above water. The fishermen have assured me, that they saw one aground, on the great bank, in 45 fathom water, that was, at least, ten leagues in circumference. It must, accordingly, have been of a prodigious height. Ships do not come near these ices, from the danger of their overturning, in proportion as they dissolve on the side exposed to the greatest heat."

These ices, it is to be observed, by the time they reach the banks of Newfoundland, and in fact, they scarcely go farther, are nearly half melted. They are detached from the north by the summer's heat, and are enabled to make even such a progress southward, only by means of their floating down the current, which carries them toward the line, where they arrive in a state of dissolution to replace the waters which the sun is continually evaporating in the torrid zone. Our mariners see only the borders and the crumbs, as it were, of these polar masses, which must

have at their center an elevation proportioned to their extent. For my own part, I consider the two hemispheres of the earth as two mountains, with their bases applied to each other at the line, the poles as the icy summits of these mountains, and the seas as rivers flowing from these summits.

From this view of the subject, if we picture to ourselves the proportions which the glaciers of Switzerland bear to their mountains, and to the rivers which flow from them, we shall be able to form some idea, faint I acknowledge, of the proportions which the glaciers of the poles must have to the whole globe and to the ocean. The Cordeliers of Peru, which, compared to the two hemispheres, are mere mole-hills, and the rivers, which issue from them, rills only of water, when contrasted with the sea, have selvages of ice from twenty to thirty leagues broad, bristled at their center with pyramids of snow from twelve to fifteen hundred fathoms high. What, then, must be the elevation of those two domes of polar ice, which have in winter bases of two thousand leagues in diameter? I have no doubt that their thickness at the poles, must have represented the earth as oval, in central eclipses of the moon, conformably to the observations of Tycho Brhaé and of Kepler.

I deduce from this configuration another consequence. If the elevation of the polar ices is capable of changing in the heavens the apparent form of the globe, their weight must be sufficiently great to influence its motion in the ecliptic. There is, in fact, a very singular correspondence between the movement, by which the earth alternately presents its two poles to the sun, in the revolution of a year, and the alternate effusions of the polar ices, which take place in the course of the same period. Permit me for a moment to explain the manner in which I conceive this motion of the earth to be the effect of these effusions.

Admitting with astronomers the laws of attraction among the heavenly bodies, the earth must certainly present to the sun, which attracts it, the heaviest part of its globe. Now this part must be one of its poles, when it is surcharged with a cupola of ice, of an extent of two thousand leagues, and of an elevation superior to that of the continents. But as the ice of this pole, which its gravity inclines toward the sun, melts in proportion to its vertical approximation, and as, on the contrary, the ice of the opposite pole, increases in proportion to its removal, the necessary consequence must be, that the first pole becoming lighter, and the second heavier, the centre of gravity passes alternately from one to the other, and from this reciprocal preponderancy must ensue that motion of the globe in the ecliptic which produces our summer and winter.

From this alternate preponderancy, it must also happen, that our hemisphere, containing more land than the southern hemisphere, and being consequently heavier, must incline toward the sun for a greater length of time; and this, too, corresponds to the matter of fact, for our summer is five or six days longer than our winter. A farther consequence is, that our pole cannot lose its center of gravity, till the opposite pole becomes loaded with a weight of ice superior to the gravity of our continent and the ices of our hemisphere; and this again is agreeable to fact, for the ices of the south pole are more elevated, and more extensive than those of the north, as appears from our navigators, who have been able to penetrate no farther south than to the seventieth degree, whereas, in the northern latitude, they have advanced no less than eighty-two degrees. And here we may discover a reason which determined nature to divide our globe into two hemispheres, of which the one should contain the greatest quantity of dry land, and the other the greatest quantity of water; to the end that this movement of the globe might possess at once consistency and versa-

lity. We may see also, why the south pole is placed directly in the midst of the seas, far from the vicinity of land; that it might be able to load itself with a greater mass of marine evaporations, and that these evaporations, accumulated into ice around it, might balance the weight of the continents with which our hemisphere is surcharged.

To this mode of reasoning, I am aware, that a very formidable objection may be started; which is this: If the polar effusions occasion the earth's motion in the ecliptic, the moment would arrive, in which, its two poles being in equilibrio, it could present to the sun the equator only.

I acknowledge, that I have no reply to make to this difficulty, unless it be a reply to say, that we must have recourse to an immediate will of the author of nature, who is pleased, perhaps, to destroy the instant of this equilibrium, and who re-establishes the balancing of the earth on its poles, by laws with which we are totally unacquainted. Now this concession no more weakens the probability of the hydraulic cause, which I apply to it, than that of the principle of the attraction of the heavenly bodies, which attempts to explain it, I will venture to affirm, with much less clearness: for this very attraction, if nothing else acted in the heavens, would soon deprive the earth of all manner of motion. If we wish to be sincere, we shall acknowledge the existence of an intelligence superior to our own, from which, in reality, must issue all the mechanical causes of our most ingenious systems. The will of God is the ultimatum of all human knowledge.

From this objection, however, I shall deduce consequences, that will diffuse new light over the ancient effects of polar effusions, and illustrate the manner in which they might have produced the deluge of the globe.*

* According to Herodotus, the priests of Egypt affirm, that the sun has several times changed his course: so that, in reality there is nothing new

On the supposition, then, of the re-establishment of the equilibrium between the poles, and of the earth's constantly presenting its equator to the sun, it is extremely probable, that, in this case, it would be set on fire. In fact, on this hypothesis, the waters which are under the equator, being evaporated by the unremitting action of the sun, would become irrevocably fixed in ice at the poles, where they would receive, without effect, the influence of that luminary, which would be to them constantly in the horizon. The continents being thus dried up, under the torrid zone, and inflamed by a heat every day increasing, would quickly catch fire. Now if it be probable that the earth would perish by fire, if the sun's motion were confined to the equator, it is no less probable, if the course of the sun were in the direction of the meridian, that it must be deluged by water, opposite means producing contrary effects.

in our hypothesis. Perhaps, too, they drew from it the same inferences. One thing however is certain, which is, that they believed the earth would one day be destroyed by a general conflagration, as it had already been overwhelmed by an universal deluge. It was one of their kings, if I am not mistaken, who, as a security against either of these calamities, had two pyramids erected, the one built of brick, as a preservative against fire, the other of stone, to secure it from inundation. The opinion of a future conflagration of nature, prevails among a variety of nations. But effects so terrible, which would speedily result from the mechanical causes by which man endeavours to explain the laws of nature, can take place only by an immediate order of the Deity. He preserves his works with the same wisdom with which he created them. Astronomers have, for many ages, been examining the annual motion of the earth in the ecliptic, and have never seen the sun, so much as for a single second, on either side of the tropics. God governs the world by variable powers, and deduces from those powers, harmonies that are invariable. The sun neither moves in the circle of the equator, which would set the earth on fire, nor in that of the meridian, which would inundate it with water; but his course is traced in the ecliptic, describing a spiral line between the two poles of the world. In this harmonious course, he dispenses cold and heat, dryness and humidity, and derives from these powers, each destructive by itself, latitudes, so varied and so temperate, all over the globe, that an infinite number of creatures, of an extreme delicacy, find in them every degree of temperature adapted to the nature of their frail existence.

We have just seen, that the alternate effusions of a part only of the polar ices, are sufficient for renewing all the waters of the ocean, for producing all the phenomena of the tides, and for effecting the balance of the earth in the ecliptic. Were the whole of these ices to be dissolved, and the consequent effusions to take place at once, we believe them capable of completely inundating the globe. Let it only be remarked, that the effusion of but a part of the ices of the Cordeliers, in Peru, is sufficient to produce an annual overflow of the Amazon, of the Oroonoko, and of several other great rivers of the new world, and to inundate a considerable part of the Brazil, of Guiana, and of the *terra firma* of America; that in like manner the melting of part of the snows on the Mountains of the Moon in Africa, occasions every year the inundations of Senegal, contributes to those of the Nile, and overflows vast tracks of country in Guinea, and the whole of lower Egypt, and that similar effects are annually produced in a considerable part of southern Asia, in the kingdoms of Bengal, Siam, Pegou, Cochin-China, and in the districts watered by the Tigris, the Euphrates, and many other rivers of Asia, which have their sources in chains of mountains perpetually covered with ice, namely, Taurus and Imaüs. Who, then, can doubt, that the total fusion of the ices of both poles, would be sufficient to swell the ocean above every barrier, and completely to inundate the two continents? Must not the elevation of those two cupolas of polar ice, vast as oceans, far surpass the elevation of the highest land, when we find even the simple fragments of their extremities, after they are half dissolved, to be superior to the turrets of Notre Dame, and to rise to the height of from fifteen to eighteen hundred feet above the sea? The ground on which Paris stands, at forty leagues distance from the shore of the sea, is only twenty two fathoms above the level of neap tides, and no more than eighteen above the highest spring tides; and a great part of

both the old and new world is of an elevation much inferior even to this.

For my own part, if I may acknowledge the presumption, I actually ascribe the general deluge to a polar effusion of this kind, added to that of the icy mountains, such as the ices of the Cordeliers and of mount Taurus, for instance, the chains of which extend from twelve to fifteen hundred leagues in length, with a breadth of twenty or thirty leagues, and an elevation of from twelve to fifteen hundred fathom. I add, also, the waters diffused over the atmosphere, in clouds, and imperceptible vapours, which would form of themselves, when collected on the earth, a very considerable mass of water.

At the epoch of this tremendous catastrophe I suppose the sun, leaving the ecliptic, to have advanced from south to north*, and pursued the direction of one of the meridians which passes through the middle of the Atlantic Ocean and of the South Sea. In this course he heated only a zone of water, frozen and unfrozen, of the breadth, through the greater part of the circumference, of four thousand five hundred leagues. He extracted long belts both of land and sea fogs, which accompany the melting of all ices, from the chain of the Cordeliers, for instance, from the different branches of the icy mountains of Mexico, from Taurus and Imaüs, which run, in like manner, south and north, from the sides of Atlas, the summits of Teneriff, Jura, Ida,

* I find an historical testimony in support of this hypothesis, in the history of China, by Father Martini, book i. During the reign of Yaus, the seventh emperor, the annals of the country relate, that for six days together the sun "never set, so that a general conflagration was apprehended." The result, on the contrary, was a deluge, which inundated the whole of China. The epoch of this Chinese deluge, and that of the universal deluge, are in the same century. Yaus was born 2307 years before Christ, and the universal deluge according to the Hebrews, happened 2348 years before the same epoch. The Egyptians likewise, had traditions respecting these antient alterations of the sun's course.

Lebanon, and all the mountains covered with snow, which lay exposed to his direct influence. In his course, the constellation of the bear, and that of the crofs of the south were quickly set on fire, with his vertical flame; and, presently, the vast cupolas of ice, on both poles, smoaked on every side. All these vapours united to those which arose out of the ocean, covered the earth with an universal rain. The action of the sun's heat was farther augmented by that of the burning winds of the sandy zones of Africa and Asia, which blowing, as all winds do, towards the parts of the earth where the air is most rarefied, precipitated themselves, like battering rams of fire, toward the poles of the world, where the sun was then acting with all his energy. Innumerable torrents immediately burst from the north pole, which was then the pole most loaded with ice, as the deluge commenced on the 17th of February, when winter exerted its full power over our hemisphere. These torrents issued all at once from every floodgate of the north; from the Straits of the sea of Anadir, from the deep gulph of Kamschatka, from the Baltic Sea, from the Straits of Waigat's, from the unknown sluices of Spitzbergen and Greenland, from Hudson's Bay, and from that of Baffin, which is still more remote. Their roaring currents, rushing furiously down, partly through the channel of the Atlantic Ocean, hurled up the abyfses of its profound bason; then, driving impetuously beyond the line, and their collateral counter tides being forced back upon them, and increased by the currents from the south pole, which had been set a flowing at the same time, they poured upon our coasts the most tremendous floods. They rolled along in their surges, a part of the spoils of the ocean, situated between the ancient and the new continent. They spread over the plains of Normandy, the vast beds of shells which pave the bottom of the seas at the Antilles, and Cape Verd Islands, and carried even those which adhere to the rocks of Magellan's Strait, as

far as to the plains which are watered by the Saône. Met by the general current of the pole, they formed at their confluences horrible counter-tides, which conglomerated, in their vast funnels, sands, flints and marine bodies, into masses of indigested granite, into irregular hills, into pyramidal rocks, whose protuberances variegate the soil in many places of France and Germany. This meeting of the two general currents of the Poles, happening to take place between the tropics, tore up from the bed of the seas huge banks of madrepores, and tossed them, unseparated, on the shores of the adjacent islands, where they subsist to this day.*

* I have seen in the Isle of France, some of those great beds of madrepores of the height of seven or eight feet, resembling ramparts, left quite dry at more than three hundred paces from the shore. The ocean has left on every land some traces of its ancient excursions. There have been found on the steep shores of the district of Caux, some of the shells peculiar to the Antilles islands, particularly a very large one, called the *Tbailée*, in the vineyards of Lyons that which they call the cock and hen, and which is caught alive in no sea whatever but the straits of Magellan, and in the sands of Estampes, the teeth and jawbones of sharks. Our quarries too are filled with spoils of the southern ocean. On the other hand, if credit may be given to the memoirs of Father le Comte, the Jesuit, there are in China strata of vegetable earth from three to four hundred feet deep; and to these strata he ascribes, and with good reason, the extreme fertility of the country. Our best soils in Europe are not above three or four feet deep. If we had geographical charts which should represent the different layers of our fossil shells, we might distinguish in them the directions and the focuses of the ancient currents which lodged them. I shall pursue this idea no further; but there is another, which may present new objects of curiosity to the learned, who estimate the monuments raised by man at greater value than those of nature. It is this: as we find in the fossils of these western regions, a multitude of the monuments of the sea, we might perhaps be able to trace in the strata of vegetable earth of three and four hundred feet depth, in the countries of the east, those of our ancient continent. It is certain, for instance, from the testimony of the missionary above quoted, that pit-coal is so common in China, that most of the Chinese make use of no other fuel. Now, it is well known that pit-coal owes its origin to our forests, which have been buried in the bowels of the earth. It might be possible, therefore, to find, amidst these wrecks of the vegetable creation, those of terrestrial animals, of men and of the first arts of the world, such, at least, as possessed some degree of solidity.

In other places, their waters, slackening at the extremity of their course, spread themselves over the surface of the ground, in vast sheets, and deposited, by repeated undulations, in horizontal layers, the wreck and the vicidities of an infinite number of fishes, sea-urchins, sea weeds, shells, corals, and formed them into strata of gravel, marble, marle, plaster, and calcareous stones, which constitute, to this day, the soil of a considerable part of Europe. Every layer of our fofsils was the effect of an universal tide. While the effusions of our polar ices were covering the western extremities of the continent with the spoils of the ocean, they were spreading over its eastern extremities those of the land, and deposited on the soil of China, strata of vegetable earth from three to four hundred feet deep. Then it was, that all the plans of nature were reversed. Complete islands of floating ice, loaded with white bears, run aground among the palm trees of the torrid zone, and the elephants of Africa were toised amidst the fir groves of Siberia, where their large bones are found to this day. The vast plains of the land, inundated by the waters, no longer presented a career to the nimble-footed courser, and the surface of the sea, wrought into fury, ceased to be navigable. In vain did man think of flying for safety to the lofty mountains. Thousands of torrents rushed down their sides, and mingled the confused noise of their waters with the howling of the winds and the roaring of the thunder. Black tempests gathered round their summits, and diffused a night of horror in the very midst of day. In vain did he turn to the heavens, looking, with anxious eye, for the place where Aurora was wont to appear; he perceives nothing, in the whole circuit of the horizon, but piles of dark clouds, heaped upon each other. A pale glare, here and there, furrows their gloomy and endless battalions; and the orb of day, veiled by their livid coruscations, emits, scarcely

light sufficient to afford a glimpse in the firmament of his bloody disk, wading through new constellations.

From the disorder reigning in the heavens, man despairs of the safety of the earth. Unable to find in himself the last consolation of virtue, that of perishing free from the remorse of guilt, he seeks, at least, to conclude his last moments in the bosom of love, or of friendship. But, in that age of depravity, when all the sentiments of nature were extinguished, friend repelled friend, the mother her child, the husband the wife of his bosom. In this deluge of waters, every thing was swallowed up: cities, palaces, majestic pyramids, triumphal arches, embellished with the trophies of kings; and ye, also, who were worthy of surviving the ruin even of a world, ye peaceful grottoes, tranquil bowers, humble cottages, the retreats of innocence! There remained on the earth no trace of the glory and felicity of mortals in those days of vengeance, when nature involved in one wreck the very monuments of her own greatness.

Such convulsions, of which traces, without number, still remain on the surface, and in the bowels of the earth, could not possibly have been produced simply by the action of an universal rain. I am aware, that the letter of scripture is exprefs in this respect; but the circumstances which are combined with the account, seem to admit the means by which, on my hypothesis, that tremendous revolution was effected.

In the book of Genesis, it is said, that it rained over the whole earth, for forty days and forty nights. This rain, as we mentioned before, was the result of the vapours produced by the melting of the ices, both of the land, and of the sea, and by the zone of water, which the sun passed over, in the direction of the meridian. As to the period of forty days, it appears to me to be abundantly sufficient for the sun, acting vertically on the polar ices, to reduce them to the level of the seas; since, scarcely more than three weeks are

requisite, when he is in the vicinity of the tropic of Cancer, to melt a considerable part of those on our poles. Nay, at that season, nothing more seems to be wanting, but some gales of southerly or south westerly wind, for a few days, to disengage from the ice the southern coast of Nova Zembla, and to clear the strait of Waigat's, as has been observed by Martens, Barents, and other navigators of the North.

It is farther said, in the Book of Genesis, "that all the *fountains of the great deep* were broken up, and that the *windows of heaven* were opened." The expression, *the fountains of the great deep*, can in my opinion be applied only to an effusion only of the polar ices, which are the real sources of the sea, as the effusions of the ice on mountains, are the sources of all the great rivers. The expression, the *windows*, or cataracts, of *heaven*, denotes likewise, if I am not mistaken, the universal resolution of the waters, diffused over the atmosphere, which are there supported by the cold, the focuses of which were then destroyed at the poles.

It is afterwards said, in Genesis, that after it had rained for forty days, "God made a wind to blow," which caused the waters that covered the earth to disappear. This wind, undoubtedly, brought back to the poles the evaporations of the ocean, which fixed themselves anew in ice. The account in Genesis, concludes with circumstances which seem to refer all the effects of this wind to the poles of the world; for, it is said, "The fountains also of the deep, and the *windows of heaven*, were stopped, and the rain from *heaven* was restrained; and the waters returned from off *the earth*, (that is, from side to side) continually, and *after the end of the hundred and fifty days the waters were abated.*"*

The return or agitation of these waters from side to side, continually, perfectly corresponds with the motion of the seas from the lines to the poles, which must then have been

* Chap. viii. verse 2 and 3.

effected without any obstacle, because the globe was entirely aquatic, and because it may be supposed also that its annual balancing in the ecliptic, of which the polar ices are, at once, the moving powers and the counterpoise, had degenerated, at that time, into a diurnal titubation, as a consequence of its first motion. These waters retired then, from the ocean, when they came to be converted anew into ice upon the poles; and it is worthy of remark, that the space of a hundred and fifty days, which they took to fix themselves in their former station, is precisely the time which each of the poles annually employs to load itself with its periodical congelations.

We find, besides, in the sequel of this historical account of the deluge, expressions analogous to the same causes: "God said again to Noah, while the earth remaineth, seed-time and harvest, and cold and heat, and summer and winter, and day and night shall not cease."*

There can be nothing superfluous in the words of the author of nature, as there is nothing of this description in his works. The deluge, as we observed before, commenced on the 17th day of the second month of the year, which was among the Hebrews, as with us, the month of February. The cultivators of the earth had by this time cast the seed into the ground, but they had not reaped the harvest. Cold succeeded not that year to the heat, nor summer to winter, because there was neither winter nor cold, from the general fusion of the polar ices, which are their natural focusses; and the night, properly so called, did not follow the day, because there was then no night at the poles, where there is alternately a night of six months, because the sun pursuing the direction of a meridian, illuminated the whole earth, as is the case now, when he is in the equator.

To the authority of the book of Genesis, I shall subjoin a very curious passage from the book of Job, which describes

* Chap. viii. verse 22.

the deluge and the poles of the world as possessing the principal characters which I have just been exhibiting.

Vulgate Latin Version.
Chap. xxxviii.

Translation of St. Pierre's
Version.

4. Ubi eras quando ponebam fundamenta terræ? Indica mihi, si habes intelligentium.

5. Quis posuit mensuras ejus, si nōsti? Vel quis tetendit super eam, lineam?

6. Super quo bases illius solidatæ sunt? Aut qui demisit lapidem angularem ejus,

7. Cum manē laudarent simul astra matutina, et jubilarent omnes filii Dei?

8. Quis conclusit ostiū* mare, quando erumpebat quasi de vulva procedens:

4. Where wast thou when I laid the foundations of the earth? tell me, if thou hast any knowledge.

5. Who determined its dimensions, if thou knowest? and who regulated its levels?

6. On what are its foundations fastened; and who laid its corner stone,

7. When the stars of the morning praised me together, and all the sons of God were transported with joy?

8. Who appointed gates to the sea, to shut it up again, when it inundated the earth, rushing as from the womb of its mother:

* Though the sense which I affix to this passage does not widely differ from that of the learned M. de Sacy, in his excellent translation of the Bible, there are at the same time several expressions to which I assign a meaning directly opposite to his.

1st. *Ostium*, properly speaking, signifies an opening, a disgorging, a sluice, a floodgate, a mouth; and not a barrier, according to his translation. Observe how admirably the sense of this verse, and of that which follows, is adapted to the state of constraint and inactivity in which the sea is retained at the poles, surrounded with clouds and darkness like a child in swaddling cloaths in his cradle. They are expressive also of the thick fogs which surround the basis of the polar ices, as is well known to all the mariners of the north.

2dly. The preceding epithets of the *foundations of the earth*, the *fastening of the foundations*, the *stretching the line upon it*, the sea breaking forth, as if *issuing from the womb*, determine particularly the poles of the world, from whence the

9. Cum ponerem nubem vestimentum ejus, et caligine illud, quasi pannis infantiae, obvolveram?

10. Circumdedi illud terminis meis, et posui vectem et ostia.

11. Et dixi: Usque huc venies, sed non procedes amplius, et hic confringes tumentes fluctus tuos.

12. Numquid post ortum tuum praecepisti diluculo, et ostendisti auroræ* locum suum?

13. Et tenuisti concutiens extrema terræ, et exculsisti impios ex ea?

14. Restituetur ut lutum† signaculum, et stabit sicut vestimentum.

9. When I gave it the clouds for a covering, and wrapped it up in darkness, as a child is wrapped in swaddling clothes?

10. I shut it up in bounds that were known to me; I appointed for it a bulwark and sluices.

11. And said to it, Thus far shalt thou come, but no farther, and here shall the pride of thy billows be broken.

12. Is it thou, who, in opening thine eyes to the light, hast given commandment to the dawning of the day to appear, and hast shewn to Aurora the place where she ought to arise?

13. Is it thou, who, holding in thy hands the extremities of the earth, hast convulsed it, and shaken the wicked out of it?

14. A multitude of minute monuments of this event shall remain impressed on the clay, and shall subsist as the memorials of this devastation.

the seas flow over the rest of the globe. The epithet of *corner stone* seems, likewise, to denote more particularly the north pole, which, by its magnetic attraction, distinguishes itself from every other point of the earth.

* *Aurora locum suum*, the place of the aurora. The aurora borealis is perhaps here intended. The cold of the poles produces the aurora, for there is scarce any such thing between the tropics. The pole is accordingly, properly speaking, the natural place of the aurora. In the verse following the expression, *tenuisti concutiens extrema terræ*, evidently characterizes the total effusions of the polar ices, situated at the extremities of the earth, which occasioned the universal deluge.

† *Restituetur ut lutum signaculum*. This verse is very obscure in the translation of *M. de Sacy*. It appears to me descriptive of the fossil shells, which, over the whole earth are monuments of the deluge.

15. Auferetur ab impiis lux sua, et brachium excelsum confringetur.

15. The light of the wicked shall be taken from them, and their uplifted arm shall be broken.

16. Numquid ingressus es profunda maris, et in novissimis abyssi* deambulasti?

16. Hast thou penetrated to the bottom of the sea, and walked over the sources which renovate the abyss?

17. Numquid apertæ sunt tibi portæ mortis,† et ostia tenebrosa vidisti?

17. Have these gates of death been opened unto thee; and hast thou surveyed the dark disgorgings of the deep?

18. Numquid considerasti latitudinem terræ?‡ Indica mihi, si nosti omnia.

18. Hast thou observed where the latitude of the earth terminates? If thou knowest these things, declare them to me.

* *In novissimis abyssi*, at the sources of the abyss, *Saci* has translated in the *extremities of the abyss*, which destroys the correspondence of this expression with that of the other polar characters so clearly explained before; and the antithesis *novissima*, with that of *profunda maris*, which precedes it, by giving to it the same meaning. Antithesis is a figure in frequent use among the Orientals, and especially in the book of Job. The phrase *novissima abyssi* literally signifies the places which renovate the abyss, the sources of the sea, and consequently the polar ices.

† *Portæ mortis et ostia tenebrosa*, the gates of death and the dark disgorgings of the deep. The poles being uninhabitable, are in reality the gates of death. The epithet dark, here, denotes the nights of six months duration, which hold their empire at the poles. This sense is further confirmed in the following verses, by the *locus tenebrarum*, place of darkness, and the *thesaurus nivis*, treasures of the snow. The poles are at once, the place of darkness and that of aurora.

‡ *Latitudinem terræ*. Literally, Hast thou perceived the latitude of the earth? In truth all the characters of the pole could be known only to those who had travelled over the earth in its latitude. In the times of Job there were many Arabian travellers who directed their course eastward, westward, and southward, but very few who had travelled northward, that is to say, in its latitude, or breadth.

19. In quâ viâ lux habitat, et tenebrarum quis locus sit :

20. Ut ducas unumquodque ad terminos suos, et intelligas semitas domûs ejus.

21. Sciebas tunc quod nasciturus es? Et munera dierum tuorum noveras?

22. Numquid ingressus es thesauros nivis, aut thesauros granidinis aspexisti,

23. Quæ preparavi in tempus hostis, in diem pugnæ et belli?

19. Tell me where the light inhabits, and where is the place of darkness :

20. That thou mayst conduct each to its destination, seeing thou knowest their habitation, and the way that leads to it.

21. Didst thou know, as these things already existed, that thou thyself wert to be born ; and hadst thou then discovered the fleeting number of thy days ?

22. Hast thou, I say, entered into the treasures of the snow, and surveyed those tremendous reservoirs of hail,

23. Which I have prepared against the time of the adversary, and for the day of battle and war ?

The reader, I flatter myself, will not be displeased, that I have departed a little from my subject, in order to exhibit to him the agreement of my hypothesis with the traditions of the holy scripture ; and especially with those, though not free from obscurity, of a book, the most ancient, perhaps, that exists : for our learned theologicians are of opinion, that Job wrote prior to Moses. Be this, however, as it may, no one has painted nature with greater sublimity.

We may farther assure ourselves of the general effect of the polar effusions on the ocean, from the particular effects of the icy effusions of mountains on the lakes and rivers of the continent. I shall cite here some examples of these last ; for the human mind, from its natural weakness, loves to particularize all the objects of its studies ; and for this

reason it is, that it apprehends much more quickly the laws of nature in small objects, than in those which are great.

Addison, in his *Remarks on Mifson's Tour to Italy*, page 322, says, that in the Lake of Geneva, in summer, there is a kind of flux and reflux towards evening, occasioned by the melting of the snows, which fall into it in greater quantities in the afternoon than during any other period of the day. He explains, also, with his accustomed clearness, from the alternate effusions of the ices on the mountains of Switzerland, the intermittence of certain fountains of that country, which flow only at particular hours of the day.

If this digression were not already too long, I could demonstrate, that there is not a fountain, a lake, nor a river, subject to a particular flux and reflux, but what is indebted for it to icy mountains, which supply their sources. I shall subjoin, however, but a single instance more, which shall be that of the Euripus, the frequent and irregular movements of which so much embarrassed the philosophers of antiquity, and which may be so easily explained from the icy effusions of the neighbouring mountains.

The Euripus, it is well known, is a strait of the Archipelago, which separates the ancient Beotia from the island of Eubea, now Negropont. About the middle of this strait, where it is most narrow, the water is known to flow sometimes to the north, sometimes to the south, ten, twelve, and even fourteen times a day, with the rapidity of a torrent. These multiplied, and, frequently, unequal movements, cannot possibly be referred to the tides of the ocean, which are scarcely perceptible in the Mediterranean. A Jesuit, quoted by Spon,* endeavours to reconcile them to the phases of the moon; but supposing the table he gives of them to be accurate, their regularity and irregularity

* Voyage to Greece and the Levant, by Spon, vol. ii. page 340.

would still remain a difficulty of no easy solution. He refutes Seneca, the tragic poet, who ascribes to the Euripus but seven fluxes during the day alone, that is, *Dum laesa Titan mergat oceano juga* :—*Till Titan's weary steeds plunge into the ocean.* And he farther adds, I know not by what authority, that in the sea of Persia the flux never takes place but in the night time, and that under the arctic pole, on the contrary, it is perceptible twice in the day time, without being ever observed in the night. But this is not the case, he says, with the Euripus.

I shall observe, by the way, that his remark with respect to the pole, supposing it true, evinces that its two diurnal fluxes are the effects of the sun, which acts only during the day on the two icy extremities of the continents of the new world, and of the old. As to the Euripus, the variety, the number, and the rapidity of its fluxes prove, that they have their origin in like manner in icy mountains, situated at different distances, and under different aspects of the sun. For, according to the same Jesuit, the island of Eubea, which is one side of the strait, contains mountains covered with snow for six months of the year; and we know equally well, that Beotia, which is on the other side, has mountains of an equal elevation, and even some which are crowned with ice all the year round, such, for instance, as Mount Oëta. If these ebbs and flows of the Euripus take place as frequently in winter, which is not affirmed, the cause of them must be ascribed to the rains which fall, at that season of the year, on the summits of these lofty collateral mountains.

I shall enable the reader to form an idea of these, not very apparent, causes of the movements of the Euripus, by transcribing what Spon relates, in another place,* of the lake of Livadia or Cœpæide, which is in its vicinity. This

* Voyage to Greece and the Levant, by Spon, Vol. ii. pages 88 and 89.

lake receives the first fluxes of the icy effusions of the mountains of Beotia, and communicates them, no doubt, to the Euripus, through the mountain which separates them. "It receives," says he, "several small rivers, as the Cephissus, and others, which water that beautiful plain, which is about fifteen leagues in circumference, and which abounds in corn, and pasture. It was also, formerly, one of the most populous regions of Beotia. But the water of this lake sometimes swells so violently, by the rains and melted snows, that it once inundated two hundred villages of the plain. It would even be capable of producing a regular inundation every year, if nature assisted, perhaps, by art,* had not contrived for it an

* Spon, undoubtedly, did not consider what he was saying, when he suggested an idea of the possibility of art assisting nature in the construction of five subterraneous canals, each ten miles long, through a solid rock. These subterraneous canals are frequently met with in mountainous countries, of which I could produce a thousand instances. They contribute to the circulation of waters, which otherwise could not force a passage through extended chains of mountains. Nature pierces the rocks, and sends rivers through the apertures, just as she has pierced several of the bones of the human body, for the purpose of transmitting certain veins. I leave to the reader the prosecution of this new idea. I have said enough to convince him, that the globe is not the production either of disorder or of chance.

I shall conclude these observations with a reflection respecting the two travellers I have been quoting, and which may be attended, perhaps, with a good moral effect. Jacob Spon was a Frenchman, and George Wheeler, an Englishman. They travelled in company over the Archipelago. The former brought home with him a large collection of greek inscriptions and epitaphs; and the literati of the last age highly extolled him. The other has introduced the names and characters of a great many very curious plants, which grow on the ruins of Greece, and which, in my opinion, give to his narrative, a very affecting interest. He is little known among us. From the titles which these writers affix to their names, it appears, that Spon was a physician, associate of Lyons, and an eager investigator of the monuments of men; and Wheeler, a country gentleman, and enthusiastically attached to those of nature. Their tastes, to judge from their situations, ought to have been reversed; that is, the gentleman should have been fond of monumental inscriptions, and the physician of plants; but, as we shall have occasion to observe, in the sequel of

“ outlet, by means of five great canals, under the adjacent
 “ mountain of the Euripus, between Negropont and Ta-
 “ landa, through which the water of the lake is gulped up;
 “ and pours itself into the sea, on the opposite side of the
 “ mountain. The Greeks call the place Cantabathra.
 “ Strabo, speaking of this lake, says, nevertheless, that
 “ there appeared no outlet in his time, unless it be,
 “ that the Cephissus, sometimes, forced a passage under
 “ ground. But it is only necessary to read the account
 “ which he gives of the changes that take place in this
 “ morafs, not to be surprised at what he has affirmed of its
 “ outlets. Wheeler, who went to examine this spot, after
 “ my departure from Greece, says it is one of the greatest
 “ curiosities in the country, the mountain being near ten
 “ miles broad, and almost an entire mass of solid rock.”

I have no doubt that several objections may be started against the hasty explanation which has been given of the course of the tides, of the earth's motion in the ecliptic, and of the universal deluge, by the effusions of the polar ices; but, I venture to repeat it, these physical causes present themselves with a higher degree of probability, of simplicity, and of conformity to the general progress of nature, than the astronomical causes, so far beyond our reach, by which attempts have been made to explain them. It belongs to the impartial reader to decide. If it be right,

these studies, our passions spring out of contrarieties, and are, almost always, in opposition to our conditions. It was from an effect of this harmonic law of nature, that though these travellers were the one English and the other French, they lived in the most perfect union. I remark, to their honour, that they quote each other in terms of the highest commendation.

Ministers of state, would you form societies that shall be cordially united among themselves? do not assort academicians with academicians, soldiers with soldiers, merchants with merchants, monks with monks; but associate men of opposite conditions, and you will behold harmony pervade the whole association; provided, however, you exclude the ambitious, which indeed, is no easy task, ambition being one of the first vices, which our mode of education instils.

that he should be on his guard against the novelty of systems, which are not yet supported by puffiers, he ought, at the same time, to be no less so against the antiquity of those which have many such supporters.

Let us, however, return to the form of the great basin of the ocean. Two principal currents cross it from east to west, and from north to south. The first, coming from the south pole, puts in motion the seas of India, and, directed along the eastern extent of the old continent, runs from east to west, and west to east, in the course of the same year, forming in the Indian ocean, what are called the monsoons. This, we have already remarked; but we have not yet remarked, though it well deserves our attention, that all the bays, creeks, and mediterraneans of southern Asia, such as the gulphs of Siam, and Bengal, the Persian Gulph, the Red Sea, and a great many others, are directed, relatively to this current, north and south, so as not to be met by it.

The second current, in like manner, issuing from the north pole, gives an opposite movement to our ocean, and, enclosed between the continent of America and ours, proceeds from north to south, and returns from south to north, in the same year, forming, like that of India, real monsoons, though not so carefully observed by navigators. All the bays and mediterraneans of Europe, as the Baltic, the Channel, the Bay of Biscay, the Mediterranean, properly so called, and all those on the eastern coast of America, as the Bay of Baffin, Hudson's Bay, the Gulf of Mexico, and many others, which might be mentioned, are directed, relatively to their current, east and west; or, to speak with more precision, the axes of all openings of the land in the old and new worlds, are perpendicular to the axes of these general currents, so that their mouth only is crossed by them, and their depth not exposed to the impulsions of the general movements of the ocean

It is on account of the calmness of bays, that so many vessels run thither, in quest of ground to anchor on; and it is for this reason that nature has placed in their bottoms the mouths of most rivers, as we have before observed, that their waters might be discharged into the ocean, without being driven furiously back by the direction of its currents. She has employed similar precautions for the security of even the smallest streams, which empty themselves into the sea. There is not a single seaman of experience, who does not know that there is scarcely a creek but what has its little rivulet. But for the wisdom apparent in these dispositions, the streams, destined to water the earth, must frequently have deluged it.

Nature employs other means also for securing the course of rivers, and especially for protecting their discharges into the sea. The chief of these are islands. Islands present to the rivers channels of different directions, that, if the winds, or the currents of the ocean, should block up one of their outlets, the waters might have a free passage through another. It may be remarked, that she has multiplied islands at the mouths of such rivers as are the most exposed to this two-fold inconveniency, as at that of the Amazon, for example, which is for ever attacked by the east wind, and situated on one of the most prominent parts of America. They are there so very abundant, and form with each other channels of such different courses, that some of their outlets point north-east, and others south-east, and from the first to the last the distance is upwards of an hundred leagues.

River islands are not formed, as is generally believed, by the alluvions of the streams, on the contrary, they are for the most part very much elevated above the level of the corresponding rivers, and many of them contain rivers and mountains of their own. Islands of this description are, beside, frequently found at the confluence of a smaller and a greater river. They serve to facilitate their communication,

and to open a double passage to the current of the smaller river. As often then as you see islands in the channel of a great river, you may be assured there is some lateral inferior river or rivulet in the vicinity. Many, indeed, of these confluent rivulets have been dried up by the ill-advised labours of men; but you will always find, opposite to the islands which divided their confluence, a corresponding valley, in which you may trace their ancient channel. There are, likewise, some of these islands in the midst of the course of rivers, in places exposed to the winds. I shall observe, by the way, that we recede very widely from the intentions of nature, in reuniting the islands of a river to the adjoining continents; for its waters, in this case, flow only in a single channel, and when the winds happen to blow in opposition to the current, they can escape neither to the right, nor to the left; they swell, they overflow, they inundate the plains, carry away the bridges, and occasion most of the ravages, which, in modern times, are so frequent in our towns.

We do not, then, at the extremities of the currents of the ocean, find either bays or gulphs; but, on the contrary, islands. At the extremity of the great eastern current of the Indian Ocean, is placed the island of Madagascar, which protects Africa against its violence. The islands of the Terra-del-Fuego defend, in like manner, the southern extremity of America, at the confluence of the eastern and western currents of the south seas. In conformity to the same law, the numerous archipelagoes of the Indian Ocean and South Sea are situated about the line, where the two general currents of the north and south seas meet.

It is with islands, too, that nature protects the inlets of bays and mediterraneans. Great Britain and Ireland cover those of the Baltic; the islands of Welcome and Good-Fortune, Hudson's Bay; the island of St. Lawrence, the entrance of the gulph bearing the same name; the chain of

the Antilles, the Gulf of Mexico; the isles of Japan, the double gulf formed by the peninsula of Gorée with the country adjacent. All currents bear upon islands. The majority of them are, for that reason, remarkable for their prodigious swells and their gusts of wind; such are the Azores, the Bermudas, the island of Tristan, of Acunhah, &c. Not that they contain within themselves the causes of such phenomena, but from their being placed in the focusses of the revolutions of the ocean, and even of the atmosphere, for the purpose of weakening their effects. They are in positions nearly similar to those of capes, which are all celebrated for the violent tempests which beat upon them; as Cape Finisterre at the extremity of Europe; the Cape of Good Hope, at that of Africa; and Cape Horn, at that of America. Hence the nautical proverb, of *doubling the cape*, to express the surmounting of some great difficulty. The ocean, accordingly, instead of bearing upon the retiring parts of the continent, acts upon those which are most prominent; and which must thereby speedily have been destroyed, had not nature fortified them in a most wonderful manner.

The western coast of Africa is defended by a long bank of sand, on which the billows of the Atlantic Ocean are continually breaking. Brazil, in the whole extent of its shores, opposes to the winds, which blow continually from the east, and to the currents of the sea, a prodigious rampart of rocks more than a thousand leagues long, twenty paces broad at the summit, and at the base of an unknown thickness. It is a musket shot distant from the beach. It is entirely covered, at high water, and on the retreating of the tide exhibits the elevation of a peak. This enormous dike is composed lengthwise of one entire piece, as has been ascertained by repeated borings; and, but for the several inlets which nature has formed, it would be impossible for vessels either to enter or come out of Brazil.*

* See History of the Troubles of Brazil by Peter Moreau.

Go from south to north, and you find similar precautions. The coast of Norway is provided with a bulwark resembling nearly that of Brazil. Pontoppidan tells us, that this coast, which is almost three hundred leagues in length, is, for the most part, steep, angular, and pendant; so that the sea, in many places, presents a depth of no less than three hundred fathoms close to the shore. This, however, has not prevented nature from protecting these coasts by a multitude of great and small islands. "By such a rampart," says that author, "consisting of, perhaps, a million or more of pillars of mafsy stone, founded in the very depth of the sea, the chapters of which rise only a few fathoms above the surface, all Norway is defended to the west, equally against the enemy and against the ocean." There are, however, behind this species of sea bulwark, so wonderfully constructed, some coast harbours. But, as there is frequently great danger, adds he, of ships being driven ashore before they can get into port, from the winds and currents which are very violent in the straits of these rocks and isles, and from the difficulty of anchoring in such a vast depth of water, government has been at the expence of fastening several hundreds of strong iron rings in the rocks, more than two fathoms above water, by which vessels may be safely moored.

Nature has infinitely varied these means of protection, especially in the islands which themselves protect the continent. She has surrounded the Isle of France, for instance, with a bank of madrepores, which opens only at the places where the rivers of that isle empty themselves into the sea. Other islands, as several of the Antilles, were defended by forests of mangroves, (mangliers,) which grow in the sea water, and break the violence of the waves, by yielding to their motion: and it is to the destruction, perhaps, of these vegetable fortifications that we ought to ascribe the irruptions of the sea, now so frequent in various islands, and particularly that of

Formosa. There are others which consist of pure rock, and which rise out of the bosom of the waves like so many huge mounds; such is the Maritimo in the Mediterranean. Others are volcanic, as the isle of Fuego, one of the Cape de Verd islands, and others of the same description in the South Sea; they rise like pyramids with fiery summits, and answer the purpose of light-houses to mariners by their flame at night and their smoke in the day. The Maldivia islands are defended against the ocean by precautions the most astonishing. They are more exposed, indeed, than many others, being situated in the very midst of that great current of the Indian Ocean, of which mention has been already made, and which passes and repasses there twice a year. They are, besides, so low, as hardly to rise above the level of the water, and so small and numerous, that they have been computed at twelve thousand, and some so near to each other, that we may leap over the channel which divides them. Nature, from the beginning, collected them into clusters, or archipelagoes, separated from each other by deep channels, which go from east to west, and which present various passages to the general current of the Indian Ocean. These clusters are thirteen in number, and extend in a row from the eighth degree of north, to the fourth degree of south latitude, which gives them a length of three hundred of our leagues, of twenty-five to a degree.

But let us take the description of their architecture from the interesting and unfortunate Francis Pyrard, who passed there the flower of his days, in a state of slavery; and who has left us the best account that exists of these islands, as if it were necessary that, in every case, things the most worthy of the esteem of mankind, should be the fruit of some calamity. "It is wonderful," says he, "to behold each of these clusters encompassed in its whole circumference, with a vast bulwark of stone, and more securely protected than a spot of ground, by any human art, can be protected

“ within walls.* These clusters are all roundish or oval, and
“ are in general about thirty leagues each in circumference,
“ some a little more and others a little less, and are all in a
“ series, and end to end, without any contact whatever.
“ There are between every two, channels of the sea, some
“ broad, others very narrow. When you are in the centre
“ of a cluster, you see all around that great bulwark of
“ stone, which, as I have said, encompasses it and defends
“ the isles against the impetuosity of the ocean. But to
“ approach this bulwark, and to see the billows coming
“ from afar to burst with fury on every side, is enough to
“ daunt the boldest courage; for then, I speak with cer-
“ tainty, as a thing I have seen a thousand and a thousand
“ times, the perturbation or bubbling over, exceeds the
“ size of a house, and is whiter than a fleece of cotton; so
“ that you seem surrounded with a wall of brilliant white-
“ nefs, especially when the ocean is in his majesty.

Pyrard farther observes, that most of the isles inclosed in these subdivisions, are surrounded each in particular by a bank of its own, which farther defends them against the sea. But the current of the Indian Ocean, which passes through the parallel channels of these clusters of islands, is so violent, that it would be impossible for the people who inhabit them to keep up a communication with each other, had not nature arranged all this in her own wonderful manner. She has divided each of these clusters by two particular channels, which intersect them diagonally, and the extremities of which exactly terminate at the extremities of the great parallel channel which separates them. So that if you wish to pass from one of those archipelagoes to another, when the current is easterly, you take your departure from that where you happen to be, by the diagonal channel of the east, where the water is calm, and commit-

* Voyage to the Maldivias, chap. x.

ting yourself afterwards to the current, which passes through the parallel channel, you proceed, in a deflecting course, to land on the opposite cluster, into which you enter by the opening of its diagonal channel, which is to the west. When the current changes, six months afterwards, the mode of proceeding is reversed. Through these interior communications, the islanders, at all seasons, can make excursions from isle to isle, the whole length of the chain, from north to south, notwithstanding the violence of the currents which separate them.

Every isle has its proper fortification, proportioned, if I may so speak, to the danger to which it is exposed from the billows of the ocean. It is not necessary to suppose the water roused into a tempest, to form an idea of their fury. The simple action of the trade-winds, however uniform, is sufficient to give them, in the end, the most violent agitation. Each of these billows, having, beside the constant velocity impressed upon it every instant by the wind, a farther velocity acquired from its particular movement, would form, after running through a considerable space, an enormous mass of water, were it not that its course is retarded by the currents which cross it, by the calms which slacken it, but above all, by the banks, the shallows, and the islands, which break its force. A very perceptible effect of this accelerated velocity of the waves, is visible on the coasts of Chili and Peru, which, however, only experience the simple concussion and repercussion of the waters of the South Sea. The shores are inaccessible, through their whole extent, unless at the bottom of some bay, or under the shelter of some island, situated near the coast. All the islands of that vast ocean, so tranquil as to have obtained the appellation of Pacific, are not to be approached on the side which is exposed to the currents, though the currents are occasioned solely by the trade-winds, except, indeed, that shelves or rocks sometimes break the impe-

tuosity of the billows. In that case, to behold the vast fleeces of foam which incessantly rise from the bosom of their dark and rugged windings, and to hear their hoarse roaring noise, especially during the night, carried, by the winds, to several leagues distance, is a spectacle at once magnificent and tremendous.

Islands, then, are not fragments of the continents. Their position in the ocean, the manner in which they are defended there, and the length of their duration, are sufficient demonstrations of this. Considering how long the sea has been battering them with its utmost fury, they must, had they been parts of the continent, have by this time been totally demolished. Scylla and Charibdis, nevertheless, preserve to this day their ancient roarings, so as to be heard at the very extremities of Sicily.

This is not the place to indicate the means which nature employs to preserve the islands, and keep them in repair; nor to dwell upon the other proofs, derived, from vegetables, animals, and man, which evince that they have existed, such as we now see them, from the very origin of the globe: it will be sufficient for me, simply to give an idea of their construction, in order to produce the most entire conviction that they are in no respect the work of chance. They contain, like continents themselves, mountains, peaks, lakes, and rivers, proportioned to their magnitude. For the purpose of demonstrating this new truth, I shall again be under the necessity of saying something respecting the distribution of the globe; but I shall not be long, and shall endeavour to introduce nothing but what is absolutely unavoidable to make myself understood.

It is to be remarked first, that the chains of mountains, in both continents, are parallel to the seas which wash their coasts; so that if you see the plan of one of these chains, with its different branches, you are able to determine the coast of the sea which corresponds with them; for, as I

have just said, the mountains and their coasts are always parallel. In like manner, upon seeing the sinuosities of a shore, you may determine those of the chains of mountains which are in the interior of a country; for the gulfs of a sea always correspond to the valleys of the mountains of the lateral continent. These correspondencies are perceptible in the two great chains of the old and of the new worlds. The long chain of Taurus runs east and west, as does the Indian Ocean, the different gulfs of which it encloses, by branches prolonged as far as to the extremities of most of their capes. On the contrary, the chain of the Andes, in America, runs north and south, like the Atlantic Ocean.

There is, beside, another thing worthy of remark, and I will venture to say, of admiration, which is, that these chains of mountains are opposed to the regular winds which cross those seas, and bear away to them the exhalations; and that their elevation is proportioned to the distance at which they are placed from their respective shores; so that the farther they are removed from the sea, the greater is their elevation into the atmosphere. For this reason it is, that the chain of the Andes is placed along the South Sea, where it receives the exhalations of the Atlantic Ocean, wafted by the east wind over the vast continent of America. The broader America becomes, the greater is the elevation of that chain. Towards the isthmus of Panama, where the continent has but little breadth, and consequently where the distance from the sea is small, the elevation of the mountains is inconsiderable; but they suddenly rise, precisely in proportion as the continent of America widens. Its highest mountains look over the broadest expansion of that country, and are situated in the latitude of Cape Saint Augustin.

The situation and height of this chain were alike necessary to the fertility of this grand division of the new world. For if the chain, instead of extending lengthwise,

by the coast of the South Sea, had extended along the coasts of Brazil, it would have intercepted all the vapours conveyed over the continent by the east wind; and if it were not elevated to a region of the atmosphere, to which no vapour could ascend, because of the subtilty of the air and the intenseness of the cold, all the clouds borne by the east wind would be carried beyond it into the South Sea. On either of these two suppositions, most of the rivers of South America must remain dry.

The same reasoning may be applied to the chain of Taurus; which presents to the Northern and Indian Oceans a double ridge, with opposite aspects, from which flow most of the rivers of the ancient continent, some to the north and others to the south. Its branches are disposed in like manner; they do not coast along the peninsulas of India by their shores, but cross them through the middle, at their full length; for the winds of these seas do not blow always from one and the same quarter, as the east wind in the Atlantic always does; but six months in one direction, and six in another. It was, therefore, proper to divide to them the land which they were intended to water.

It remains for me to subjoin some farther observations respecting the configuration of these mountains, to confirm the use to which they are destined by nature. They are crowned from distance to distance by long peaks, similar to lofty pyramids. These peaks, or at least most of them, as has been well observed, are of granite. I do not know of what granite is composed; but I know that these peaks attract and fix the vapours of the atmosphere in such a quantity around them, that they themselves are frequently rendered invisible. This is a remark which I have many times made respecting the Peak of Piterboth, in the Isle of France, where I have seen the clouds, which were driving before the south-east wind, turn perceptibly aside from their direction, and gather round it, so as to form some-

times a very thick cap, which rendered the summit impossible to be seen.

I had the curiosity to examine the nature of the rock of which this peak is composed. Instead of being formed of grains, it is full of small holes, like the other rocks of the island; it melts in the fire, and when melted, you may perceive on its surface small grains of copper. It is impossible to doubt of its being impregnated with that metal; and to the copper, perhaps, is to be ascribed the virtue which it possesses of attracting the clouds. For it is known by experience that this metal, as well as iron, has the property of attracting thunder. I am ignorant of what materials other peaks are composed; but it is very remarkable, that, at the summit, and on the ridges of the Andes, are found the gold and silver mines of Chili and Peru, and that, in general, all mines of iron and copper are situated at the source of rivers, and in elevated situations, where they discover themselves by the fogs which surround them. Be this, however, as it may, and whether the attractive quality in question be common to granite, and to rocks of a different nature, or whether it depends on some metal which is amalgamated with them, I consider all the peaks in the world as real electric needles.

But it was not sufficient that clouds should fix on the tops of mountains; for the rivers which have their sources there, could have then only an intermittent course. As soon as the rainy season was at an end, they must have ceased to flow. Nature, in order to remedy this inconvenience, has contrived, in the vicinity of their peaks, lakes, which are real reservoirs, or cisterns of water, to furnish a regular and constant supply to their expenditure. Most of those lakes are of an incredible depth, and they answer several other purposes, such as that of receiving the melted snows of the adjacent mountains, which would otherwise flow with too great rapidity. When they are once full, it re-

quires a very considerable time to exhaust them. They are found, either internally or externally; at the source of all regular currents of water; but when they are external, they are proportioned, either by their extent, or by their depth and discharges, to the size of the river which they are designed to supply, in the same manner as are the neighbouring peaks. These correspondencies must, doubtless, have been known to antiquity; for, I think, I have seen some very ancient medals, in which rivers were represented by figures resting upon an urn, and stretched along the basis of a pyramid, which was probably designed to denote at once their source and their discharge.

If, then, we apply these general dispositions of nature to the particular conformation of islands, we shall see, that like continents, they have mountains, of which the branches are parallel to their bays; that these mountains are of a height corresponding to their distance from the sea; and that they contain peaks, lakes, and rivers, proportioned to the extent of their territory. Like continents, too, they have their mountains suitably disposed as to the winds, which blow over the surrounding seas. Those which are in the Indian Ocean, as the Moluccas, have their mountains near their centre; so as to receive the alternate influence of the two atmospheric monsoons. Those, on the contrary, which are under the regular influence of the east winds, in the Atlantic Ocean, as the Antilles, have their mountains thrown to the extremity of the island, which is under the wind, precisely as the Andes are situated with respect to South America. The part of the island that is toward the wind, is called, in the Antilles, *Cabsterre*; that is, *caput terra*, the head of the land, and that which is from the wind, *Bassaterre*, low land, though, for the most part, says Father du Terre,* this last, is higher and more mountainous than the other.

* Natural History of the Antilles, page 12.

The island of Juan Fernandez, which is in the South Sea, but considerably beyond the tropics, being in $33^{\circ} 40'$ of south latitude, has its northern part formed of very lofty and steep rocks, while its south side is flat and low, to receive the influences of the south wind, which blows there nearly all the year round. A description of it may be seen in Anson's Voyage round the World.

There are islands which deviate from these depositions, but they are few in number, and have distant relations, still more wonderful, and certainly well worthy of investigation. They furnish, beside, in their vegetable and animal productions, other proofs, that they are small continents in miniature. But this is not the place to exhibit them. If, as is pretended, they are the remains of a great continent, swallowed up by the ocean, they would have preserved a part, at least, of their ancient and vast fabric. We should see, rising immediately out of the middle of the sea, lofty peaks, like those of the Andes, from twelve to fifteen hundred fathoms high, exclusive of the mountains which support them. In other places, we should see these peaks supported by enormous mountains, proportioned to their magnitude, and which would contain in their cavities, large lakes, like that of Geneva, with rivers issuing from them, such as the Rhone, and precipitating themselves at once into the sea, without watering any land: for at the bottom of their majestic protuberances, there should be no plains, no provinces, and no kingdoms. These grand ruins of the continent, in the midst of the ocean, would resemble the enormous pyramids reared in the sands of Egypt, which present to the eye of the traveller, only so many frivolous and unmeaning structures, or rather those vast palaces of kings, demolished by the hand of time, of which you perceive the turrets, columns, and triumphal arches, while the habitable parts are entirely destroyed. The sage productions of nature are not, like the works of men, useless

or transitory. Every island, has its champaign country, its vallies, its hills, its hydraulic pyramids, and its naiads, and all in admirable proportion to its extent.

There are other islands again, but the number of these is still smaller, which contain mountains, more lofty than the extent of their territory would seem to require, such as that of Teneriffe, the peak of which is so high, as to be covered with ice a great part of the year. But this island has mountains also of inferior elevation, proportioned to its bays, and in the midst of which, that which supports the peak, rears itself, in the form of a dome, not unlike the dome of the Invalids, rising above the adjacent buildings. I observed it myself with particular attention, and made a drawing of it on my way to the Isle of France. The lower mountains appertain to the island, and the peak to Africa.

This peak, covered with ice, is situated directly opposite to the entrance of the great sandy desert called Zara; and contributes, no doubt, to refresh the shores and atmospheres of it, by the effusion of its snows, which takes place in the middle of summer. Nature has also placed other glaciers at the entrance of this burning desert, such as Mount Atlas. In the island of Crete, Mount Ida, with its collateral mountains, covered at all seasons with snow, is situated, in like manner, according to Tournefort, precisely opposite to the burning desert of Barca, which coasts along Egypt from north to south. These observations naturally furnish an opportunity of making some reflections both on the chains of icy mountains, and the zones of sand, scattered over the globe.

I have again to beg pardon of the reader for these digressions, into which I have been insensibly drawn; but I will render as short as possible my remaining observations, though, by abridging them, their clearness will be considerably diminished.

The icy mountains appear, from their situation, principally designed to convey coolness to the shores of the seas lying between the tropics; and the zones of sand, on the contrary, to accelerate, by their heat, the fusion of the polar ices. We shall indicate, in a very cursory manner, these admirable harmonies; for minuteness is, fortunately, not necessary, since the journals of navigators, and our geographical charts, if we study them with attention, will suffice to convince us, that the principal part of the continent of Africa is so situated, that it is the wind of the north pole which blows most constantly on its coasts, and that the shore of South America projects beyond the line so as to be cooled by the wind of the south pole. The trade winds, which prevail in the Atlantic Ocean, always participate of the influence of both poles; that which is on our side the line draws considerably towards the north pole, and that which is beyond the line depends equally on the south pole. These two winds are not oriental, as has commonly been imagined, but blow nearly in the directions of the channel which separates America from Africa.

The warm winds of the torrid zone blow, in their turn, the most constantly towards the poles; and it is singularly remarkable, that, as nature has placed icy mountains in its vicinity, to cool its seas, conjointly with those of the poles, as Taurus, Atlas, the peak of Teneriff, Mount Ida, &c. she has likewise extended there a long zone of sand, in order to increase the heat of the south wind on its way to warm the seas of the north. This zone commences beyond Mount Atlas, and encompasses the earth like a belt, extending from the most westerly point of Africa to the most easterly extremity of Asia, in a reduced distance of more than three thousand leagues. Some branches of it, however, deviate from the general course, and advance directly toward the north.

We have already remarked, that a track of country, consisting entirely of sand, is so hot, even in our climates, from the multiplied reflexion of its brilliant particles, that we never find the snow covering it for any considerable period, even in the middle of our severest winters. Those who have crossed the sands of Estampes, in summer, and in the heat of the day, well know to what a degree the heat is there reverberated. It is so ardent in certain days of summer, that, about twenty years ago, four or five paviors, who were at work on the great road leading to that city, between two banks of white sand, were suffocated by it. Hence it may be concluded, that, but for the ices of the pole, and of the mountains in the vicinity of the torrid zone, a very considerable portion of Africa and Asia would be absolutely uninhabitable; and that, but for the sands of Africa and Asia, the ices of our pole would never melt.

Every icy mountain too, has, like the poles, its sandy girdle, which accelerates the fusion of its snows; as may be seen in the description of all mountains of this nature, as the peak of Teneriff, Mount Ararat, the Cordeliers, &c. These zones of sand do not merely surround their bases, but also the higher regions of the mountains to the very foundation of their peaks; and it frequently requires several hours walking to cross them. These sands have a still further use, that of contributing to the repair of the waste, which the territory of the mountain, from time to time, undergoes; perpetual clouds of dust issue from them, which rise, in the first instance, on the shores of the sea, where the ocean forms the first deposits of these sands, which are there reduced to an impalpable powder by the incessant dashing of the waves upon them; we afterwards find these clouds of dust in the vicinity of lofty mountains. The conveyance of the sands is made from the shores of the sea into the interior of the continent, at different seasons, and in various manners. The most considerable happens at the equinoxes, for

then the winds blow from the sea into the land. See what Corneille le Bruyn says of a sandy tempest, in which he was caught on the shore of the Caspian Sea. These periodical conveyances of the sand form a part of the general revolution of the seasons. But as to the interior of different countries, partial transits take place every day, which are very perceptible towards the more elevated regions of the continents. All travellers who have been at Pekin, are agreed, that it is not possible to go abroad, during a part of the year, into the streets of that city, without having the face covered with a veil, on account of the sand with which the air is loaded. When Isbrand-ides arrived on the frontiers of China, at the extremity of the outlet of the mountains in the neighbourhood of Xaixigar, that is at that part of the crest of the Asiatic continent which is the most elevated, from which the rivers begin their courses, some to the north, others to the south, he observed a regular period of these emanations. "Every day," says he "regularly at noon, there blows a strong gust of wind for two hours together, which, joined to the sultry heat of the sun by day, parches the ground to such a degree that it raises a dust almost insupportable. I had observed this change in the air for some time before. About five miles above Xaixigar, I had found the sky cloudy over the whole extent of the mountains, and when I was on the point of leaving them, the most perfect serenity prevailed. I even remarked at the place where the mountains terminate, an arch of clouds, which swept from west to east as far as the mountains of Albase, and which seemed to form a separation of climate." Mountains accordingly possess, at once, both nebulous and fossil attractions. The first furnish water to the sources of the rivers which issue from them, and the second supply them with sand for keeping up their territory and their minerals.

* Journey from Moscow to China, chap. xi.

The icy and sandy zones on the continent of the new world are found to have a different harmony. They run, like its seas, from north to south, whereas those of the old continent proceed conformably to the lengthwise direction of the Indian Ocean, from west to east.

It is very remarkable that the influence of icy mountains extends farther over the seas, than over the land. We have seen those of the two poles take the direction of the channel of the Atlantic Ocean. The snows which cover the long chain of the Andes in America, serve, in like manner, to cool the whole of the South Sea, by the action of the east wind which passes over it, but as part of that sea, and of its shores, which is sheltered from this wind by the very height of the Andes, would have been exposed to an excessive heat, nature has formed an elbow towards the west, at the most southerly part of America, which is covered with icy mountains, so that the fresh breezes which perpetually issue from them may graze along the shores of Chili and Peru. These breezes, which are all called southerly breezes, prevail there, as appears from the testimony of every navigator, all the year round. They do not, in reality, come from the south pole, for if they did, no vessel could ever double Cape Horn; but they come from the extremity of Magellan's Land, which is evidently bent backward with relation to the shores of the South Sea.

The ices of the poles, then, renovate the waters of the sea, as the ices of the mountains renovate those of great rivers. These effusions of the polar ices press toward the line, from the action of the sun, which is incessantly pumping up the waters of the sea; in the torrid zone, and determines, by this diminution of bulk, the waters of the poles to direct themselves thither. This is the first cause of the motion of the south seas, as has been already observed. It would seem probable, that the polar effusions are proportioned to the evaporations of the ocean. But, without losing sight of the

leading object of our enquiry, we shall examine for what reason nature has taken still greater care to cool the seas, than the land, of the torrid zone: for it merits attention, that not only the polar winds which blow there, but most of the rivers which empty themselves into the south seas, have their sources in icy mountains, such as the Zara, the Amazon, the Oroonoko, &c.

The sea was destined to receive, by means of the rivers, all the spoils, vegetable and animal, of the whole earth; and as its course is determined towards the line by the daily diminution of its waters, which the sun is there continually evaporating, its shores, within the torrid zone, would soon have been exposed to putrefaction, had not nature employed these different methods to keep them cool. Certain philosophers tell us, that it is for this reason the sea between the tropics is salt. But it is likewise salt to the north; nay, more so, if we may trust to the recent experiments of the interesting M. de Pages; and, according to the testimony of an English navigator, Captain Wood, in 1676, the saltiest and the heaviest in the world. The saltness of the sea, however, does not preserve its waters from corruption, as is vulgarly believed. All who have been at sea know, that, if a bottle or a cask is filled in hot climates with sea water it soon becomes putrid. Sea water is not a pickle; it is on the contrary a real lixivium, which very quickly dissolves dead bodies. Though salt to the taste, it takes out salt sooner than fresh water, as our common sailors know from daily experience, who employ no other in freshening their salt provisions. It blanches on the shore the bones of all animals, as well as the madrepores, which, when in a state of life, are brown, red, and of various other colours, but which, being rooted up and put into the sea water on the brink of the shore, in a little time become white as snow. Nay more, if you fish in the sea for a crab, or a sea-urchin, and have them dried to preserve them, unless you first wash

them in fresh water, all the claws of the crab, and all the prickles of the urchin, will fall off. The joints, by which the limbs are fastened, dissolve in proportion as the sea water, with which they were moistened, evaporates. I have myself made this experiment to my cost. The water of the sea is impregnated not only with salt, but with bitumen, and other substances beside, which we do not know. But salt the more abounds in it to assist the dissolution of cadaverous bodies floating in it, as that which we mingle with our food assists digestion. Had nature made it a pickle, the ocean would be covered with all the impurities of the earth, which would then be kept in a state of perpetual preservation.

These observations will point out to us the use of volcanoes. They do not proceed from the internal fires of the earth, but derive both their origin, and the materials which keep them burning, from the waters. To be convinced of this, we have only to observe, that, in the interior of continents, not a single volcano is to be found, unless it be in the vicinity of some great lake, such as that of Mexico. They are situated, for the most part, in islands, at the extremity, or at the confluence, of the currents of the sea, and in the counter-tide of their waters. It is for this reason we find them in such numbers towards the line, and along the shore of the South Sea, where the south wind, which perpetually blows there, brings back all the substances swimming about in a state of dissolution.

Another proof that they owe their support to the sea is that, in their eruptions, they frequently vomit out torrents of salt water. Newton attributed their origin and their continuance, to caverns of sulphur in the bowels of the earth. But this exalted genius had not reflected on the position of volcanoes in the vicinity of the waters, nor calculated the prodigious quantity of sulphur, which the magnitude and the duration of their fires must have required.

Vesuvius alone, which has been burning night and day from time immemorial, would have consumed a mass of such matter, larger than the whole kingdom of Naples. Beside, nature does nothing in vain; and what purpose could be answered by such magazines of sulphur in the bosom of the earth? If this were the case, we should find them complete and entire, in places where they are not consumed by the fire; but mines of sulphur are nowhere found, but in the vicinity of volcanoes. What, beside, could renovate them when exhausted? A supply so constant as the maintenance of volcanoes requires, is not in the earth, but in the sea: it is furnished by the oils, the bitumens, and the nitres of vegetables and animals, which the rains and the rivers convey, from every quarter, into the ocean, where the dissolution of all bodies is completed by its lixivial waters. To these are added metallic dissolutions, and especially those of iron, which, as is well known, abounds all over the earth. These are the substances, by which volcanoes take fire and feed themselves. Lemery, the chemist, has imitated their effects, by a composition, consisting of filings of iron, sulphur, and nitre, moistened with water, which caught fire of itself. If nature had not kindled these vast furnaces on the shores of the ocean, its waters would be covered with vegetable and animal oils, which, as they resist the action of the air, could never evaporate. They are often observable, when stagnated in some undisturbed bason, from their colour, resembling the neck of a pigeon. Nature purifies the waters by the fire of volcanoes, as she purifies the air by those of thunder; and as storms are more common in hot countries, she has likewise multiplied in those countries volcanoes, and for the same reason. She burns on the shores the impurities of the sea, as a gardener burns, at the end of autumn, the refuse of his garden.

We find lavas, indeed, in the interior of countries; but a proof that they are indebted to the water for their origin is, that the volcanoes which produced them, became themselves, when the waters failed them, extinct. These volcanoes were kindled, like those which still subsist, by vegetable and animal fermentations, with which the earth was covered after the deluge, when the spoils of so many forests and animals, whose trunks and bones are still found in our quarries, floated on the surface of the ocean, and formed prodigious deposits, which the currents accumulated in the cavities of the mountains. It cannot be doubted, that, in this state, they caught fire by the simple effect of fermentation, just as we see stacks of damp hay catch fire in our meadows. It is impossible to call in question these ancient conflagrations, the traditions of which are preserved in antiquity, and which immediately succeed that of the deluge. In the ancient mythology, the history of the serpent Python, produced by the corruption of the waters, and that of Phaeton, who set the world on fire, follow directly after the history of Philemon and Baucis escaped from the waters of the deluge, and are allegories of the pestilence and volcanoes, which were the first results of the general dissolution of animals and vegetables.

I have now nothing left to do, but to refute the opinion of those who maintain that the earth is a mass of matter separated from the body of the sun. The chief arguments by which they support this opinion, are, its volcanoes, its granites, the vitrified stones scattered over its surface, and its progressive refrigeration from year to year. I respect the celebrated author who has advanced this opinion, but I venture to affirm, that the grandeur of the images which this idea presented to him, has seduced his imagination.

We have said enough upon the subject of volcanoes to demonstrate that they do not proceed from the interior of the earth. As to granites, they present, in the aggregation

of their grains, not the smallest vestige of the action of fire. I am ignorant of their origin; but surely we are not justified in referring it to that element, merely because it cannot be ascribed to the action of water, and because shells are not found in them. As the assertion is destitute of all proof, it is unnecessary to undertake a refutation of it. I shall observe, however, that, upon comparing them with the lavas of volcanoes, granites do not appear to be the production of fire; and the difference of their substances supposes different causes in their formation.

Agates, flints, and every species of the silex, seem, from their half-transparency, and from their being usually found in beds of marle, which resemble banks of extinguished lime, to be analogous to vitrifications; but these substances are not the productions of fire, for lavas never present any thing similar to them. I have picked up, on the flinty hills of Lower Normandy, oyster-shells, very complete, amalgamated with black flints, which are called *bisets*. Had these *bisets* been vitrified by fire, they would have calcined, or at least altered the oyster-shells which adhered to them; but these shells were as sound as if just taken out of the water. The shelving sea coast along the district of Caux, is formed of alternate strata of marle and *bisets*, so that when cut perpendicularly, you would call it a great wall, of which the layers had been regulated by an architect, and with so much the greater appearance of probability, as the people of the country build their houses of the same materials, disposed in the self-same order.

These banks of marle are from one to two feet broad, and the rows of flints which separate them about three or four inches thick. I have reckoned seventy or eighty of such horizontal strata from the level of the sea up to that of the land. The thickest are undermost, and the smallest at the top, which makes the shelving coast appear higher than it really is; as if nature intended to employ a certain degree

of perspective, to increase the apparent elevation; but, undoubtedly, she has been governed in this arrangement by reasons of solidity, which are perceptible in all her works. Now these banks of marle and flint are filled with shells, which have undergone no alteration from the force of fire, and which would be in perfect preservation, had not the pressure of so enormous a mass broken in pieces those which are largest. I have seen fragments of that called the *Tuilee*, which is found alive only in the Indian Ocean, and when put together, they formed a shell much more considerable than those of the same species, which are used for holding the holy-water, in the church of St. Sulpice, at Paris. I have likewise remarked there a bed of flints, completely amalgamated, and forming a single table, the section of which was perceptible, and was about an inch thick, by more than thirty feet in length. Its depth in the cliff, I am ignorant of, but, with a little art, it might be detached, and fashioned into the most superb agate table in the world. Wherever we find these marles and flints, shells are likewise found in great quantities; so that, as marle has been evidently formed out of the wreck of the shells, it appears to me extremely probable that the flints have been composed of the very substance of the fishes which were enclosed in them. This opinion will appear less extraordinary if we observe, that many of the *cornes d'ammon* and of single-shelled fossils, resisting, from their form, the pressure of the ground, and therefore not being compressed by it, have not ejected, like the double shelled, the animal matter which they contained, but exhibit it within them, under the form of crystals, with which they are usually filled; whereas the two-shelled are totally destitute of it. The animal substances of these last, confounded, I conceive, with their crushed fragments, have formed the different coloured pastes of marble, and have communicated to them the hardness and polish of which

these marbles are susceptible. This substance presents itself, even in shell fish, when alive, with the characters of agate, as may be seen in several kinds of mother-of-pearl, and among others, in the half transparent and very hard knob which terminates what is called the *Harp-shell*. Finally, this stony substance is found also in land animals; for I have seen in Silesia, the eggs of a species of the woodcock, which are highly prized in that country, not only because they are a great delicacy for the table, but because the white, when dried, becomes hard as flint, and susceptible of so beautiful a polish, that it is cut, and set as rings and other trinkets.

I could easily extend this article, by demonstrating the geometrical impossibility, that our globe should have been detached from that of the sun by the transit of a comet, because, on the very hypothesis of this impulsion, it must have been hurried along in the sphere of the comet's attraction, or carried back into that of the sun. It has, in reality, remained in the sphere of the sun's attraction; but it is not easy to conceive how it has never approached nearer, and how it maintains the distance of nearly thirty-two millions of leagues, while no comet prevents its returning to the place from which it set out. The sun, it is said, has a centrifugal force. The globe of the earth, then, must be retiring from it. No, it is alleged, because the earth has a constant tendency towards that luminary. It must, then, have lost its own centrifugal force, which, if a portion of the sun, would adhere to its very nature. I could go on to swell the article farther, by demonstrating the physical impossibility, that the earth should contain in its bowels so many heterogeneous substances, derived from a body so homogeneous as the sun; and I could prove, that it is impossible they should be in any respect considered as the wreck of solar and vitrifiable substances, (if it be possible for us to have an idea of the substances from which light issues),

for some of our terrestrial elements, such as water and fire, are absolutely incompatible. But I shall confine myself to the refrigeration ascribed to the earth, because the evidence by which this opinion is supported, is level to the comprehension of all men, and is of importance to their security.

If the earth be getting colder and colder, the sun, from which it is said to have been separated, must be getting cold in proportion, and the mutual diminution of heat in these two globes, must, in a course of ages, become perceptible, at least on the surface of the earth, in the evaporations of the seas, in the diminution of rains, and especially in the successive destruction of a great number of plants, which are killed every day, merely from the diminution of only a few degrees of heat, when the climate is changed upon them. Meanwhile, not a single plant is missing of all those which were known to Circé, the most ancient botanist upon record, whose herbal Homer has, in some measure, preserved for us. The plants celebrated in song by Orpheus, as well as their virtues, subsist to this day. There is not so much as one even which has lost any thing of its ancient attitude. The jealous Clytia still turns towards the sun, and the beautiful son of Liriope, Narcissus, continues to admire himself on the brink of the fountain.

Such are the testimonies of the vegetable Kingdom respecting the invariable constancy of the temperature of the globe: let us examine, for a moment, the evidence to be adduced from the human race. It is pretended, that some of the inhabitants of Switzerland have perceived a progressive increase of the ices on their mountains. To this evidence I could oppose that of other modern observers, who, with the view of ingratiating themselves with the princes of the north, pretend, with as little foundation, that the cold is diminishing there, because these princes have thought proper to cut down the forests of their states;

but I shall adhere to the testimony of the ancients, who, upon a subject of this nature, could have been governed by no motives of flattery whatever.

If the refrigeration of the earth is perceptible in the life of a single individual of mankind, it must be much more so in that of the human race at large; now, all the temperatures described by the most ancient historians, as that of Germany, by Tacitus, of Gaul, by Cæsar, of Greece, by Plutarch, of Thrace, by Xenophon, are precisely the same at this day as they were when these several historians wrote. The book of Job, the Arabian, which is supposed to be of greater antiquity than even the writings of Moses, and which contains views of nature much more profound than is generally imagined, of which the most common, two centuries ago, were unknown to us, makes frequent mention of the falling of the snöws in his country, which is about the thirtieth degree of north latitude. Mount Lebanon, from time the most remote, has borne the Arabian name of *Liban*, which signifies white, on account of the snöws with which its summit is covered all the year round. And Homer relates, that it snowed in Ithaca when Ulysses arrived there, which obliged him to borrow a cloak of the good Eumenes. If, during a period of three thousand years, the cold had been annually increasing in all these climates, their winters must now have been as long and as severe as in Greenland: but Lebanon and the lofty provinces of Asia have preserved the same temperature; the little isle of Ithaca is still covered in winter with the hoar-frost, and produces now, as in the days of Telemachus, the laurel tree and the olive.

STUDY V.

ANSWER TO THE OBJECTIONS AGAINST PROVIDENCE FOUNDED ON THE DISORDERS OF THE VEGETABLE KINGDOM.

THE earth, we are told, is a garden very injudiciously arranged. Men of wit, who never travelled, have amused themselves with painting it, proceeding from the hand of nature, as if the giants had been fighting in it. They represent its rivers, flowing at random ; its morasses, as so many mud-pools ; the trees of its forests, turned upside down ; its plains, buried under rocks, or overspread with briars and thorns ; all its highways rendered impassable ; all its culture, the puny efforts of human genius.

Such representations, though merely picturesque, have, I acknowledge, sometimes afflicted me, because they excited in me a distrust of the Author of nature. To no purpose was he represented, by others, as loading mankind with benefits ; if he had neglected to care for our habitation, one of our first and most pressing necessities had manifestly been overlooked,

The inundations of rivers, such as those of the Amazon, the Oroonoko, and a great many others, are periodical, and manure the lands which they deluge. Their banks, too, it is well known, swarmed with populous nations long before any European had formed a settlement there ; and those

nations derived from such overflowings, very considerable benefit, partly from the abundance of the fish, and partly from the fertility ~~thereby~~ communicated to the lands. So far from considering them as convulsions of nature, they received them as blessings from heaven, just as the Egyptians regarded the overflowings of the Nile. Was it, then, so mortifying a spectacle to them, to see their deep forests intersected with long alleys of water, which they could traverse without difficulty in all directions in their canoes, and collect the fruits at their ease? Nay, certain tribes, such as those of the Oroonoko, influenced by these accommodations, are said to have acquired the singular habit of residing on the tops of trees, and of seeking under their foliage, like the birds, a habitation, provisions, and a fortress. The majority, however, inhabited the banks only of the rivers, and these banks they preferred to the vast deserts, to be found on every side, and to which the inundations do not extend.

We, the beings of civilization, can see order only where our corn is made to grow. The habit we have acquired of confining the channels of our rivers within dikes and mounds, of gravelling and paving our roads, of applying the straight line to the alleys in our gardens, and to our reservoirs of water, of squaring our parterres, and even our trees, accustoms us, by degrees, to consider every thing which deviates from our rectangles and plans, as abandoned to confusion; whereas it is in these very places, where our own hands have been meddling, that we frequently see real disorder prevail. We have fountains playing on the tops of mountains; poplars and limes we plant upon rocks; our vineyards we throw into valleys, and we raise our meadows to the declivities of hills. If we relax awhile from our labour, all these petty levellings will frequently be confounded under the grand levellings of continents, and all this culture, the fruit of our devises, disappear before the general

and appropriate cultivation of nature. Our sheets of water degenerate into marshes; our hedge-row elms burst into luxuriance; every bower is choaked, every avenue closes; the vegetables natural to each soil declare war against the stranger plants; the starry thistle and vigorous verbascum stifle under their broad leaves the English short grass sod; thick crops of rye-grass and trefoil gather round the trees of Palestine; the bramble scrambles along their stem, with its prickly claws, as if mounting to the attack; tufts of nettles take possession of the urn of the naiads; forests of reeds of the forges of Vulcan, while green scales of minium corrode the faces of our Venuses, without paying to their beauty the smallest respect. The trees themselves lay siege to the castle; the wild cherry, the elm, the maple mount upon its steps, plunge their long pivots into its lofty pediments, and at length obtain the victory over its haughty cupolas. The ruins of a park are not less worthy the reflections of the sage, than the ruins of an empire, and equally demonstrate how feeble and inefficient is the power of man, when struggling against the omnipotence of nature.

I have not, like the primitive navigators, by whom uninhabited islands were discovered, enjoyed the felicity of contemplating the face of the earth, as it came from the hand of the creator; but I have seen portions of it so little altered, as to convince me, that nothing could then equal its virgin beauties. These beauties were not without their influence on the first depicitors of nature, and diffused a freshness, a colouring, a native and inexpressible grace over their delineations, which will ever distinguish them to advantage, notwithstanding their simplicity, from the learned descriptions which have been given of them in modern times. It is to the influence of these first aspects, I ascribe the superior talents of the earliest writers, who have made the works of nature their subject, and the sublime enthusiasm which a Homer and an Orpheus have transfused into

their poesy. Among the moderns, the historians of Anson's Expedition, Cook, Banks, Solander, and others, have described several of these natural sites in the islands of Tinian, Maso, Juan Fernandez, and Taiti, which have delighted every mind of taste, though these islands had, in part, been degraded by the Indians and Spaniards.

I have seen no other countries than those frequented by Europeans, and desolated by war, or by slavery; but I shall ever recollect, with pleasure, two of these sites, the one on this side the tropic of Capricorn, the other beyond the sixtieth degree of north latitude. I am aware of my incapacity, but I will attempt, notwithstanding, a sketch of these sites, in order to convey, as well as I am able, an idea of the manner in which nature arranges her plans, in climates so opposite.

The first was a part, at that time uninhabited, of the Isle of France, of fourteen leagues extent and which appeared to me to be the most beautiful portion of it, though the black freebooters, who take refuge there, had cut down on the sea shore, the *lataniers*, with which they fabricate their huts, and on the mountains, the palmettoes, whose tops they use as food, and the *liannes*, of which they make fishing nets. They had degraded also the banks of the rivulets, by digging out the bulbous roots of the *nymphæa*, on which they likewise subsist, and even the shore of the sea, for they eat, without exception, every species of the shelly tribes, the remains of which they leave, here and there, in piles, that have been set on fire, and burnt. Notwithstanding these disorders, the part of the island I am speaking of, had preserved traces of its ancient beauty. It is perpetually exposed to the south-east wind, which prevents the forests that cover it, from extending so far as to the brink of the sea; but a broad selva of turf, of a beautiful sea-green, which encompasses it, facilitates the communication all around, and harmonizes, on one side, with the verdure of the

woods, and on the other, with the azure of the billows. The view is thus divided into two aspects, the one exhibiting land, the other, water. The land prospect presents hills flying behind each other, in the form of an amphitheatre, and of which the contours, covered with trees, in pyramids, exhibit, on the vault of heaven, a most majestic profile. Over these forests rises, as it were, a second forest of palmetoes, which balance, above the solitary vallies, their long columns, covered with party-coloured plumes of palms, and surmounted with a spiral peak. The mountains of the interior present, at a distance, oval-shaped rocks, clothed with large trees, and pendent liannes, floating, like drapery, by every breath of the wind. Above these, are lofty pinnacles, round which are continually collected the rainy clouds; and when illuminated by the rays of the sun, you see the colours of the rainbow painted on their peaks, and the rain water flowing over their dusky sides, in brilliant sheets of crystal, or in long fillets of silver. No obstacle hinders your perambulating the borders, which embellish their sides, and their bases; for the rivulets which descend from the mountains, present, along their banks, slips of sand, or broad plates of rock, from which they have washed the earth completely away. They open besides a free passage from their source, to the place of their discharge, by undermining the trees, which are found in their channel, and by fertilizing those which grow on their margin, and they expand over these last, through their whole course, large arches of verdure, which fly off in perspective, and are visible from the shore of the sea. The liannes interweave themselves along the circumference of these arches, secure their arcades against the winds, and decorate them with the most astonishing beauty, by opposing to their foliage, other foliages, and to their verdure, garlands of glosy flowers, or pods of various hues. If a tree, wasted by age, happens to fall, nature, which accelerates,

universally, the destruction of all uselefs beings, covers its trunk with maiden hair of the most captivating green, and agarics, undulated with yellow, saffron, and purple, which feed on its spoils.

Towards the sea side, the turf which borders the island, is strewed, every here and there, with thickets of *latanier*, whose palms, formed into a fan, and attached to some pliant membranes, radiate in the air like so many verdant auns. These *lataniers* advance even into the sea, on the capes of the island, with the land birds which inhabit them; while the small bays, on the other hand, swarming with multitudes of sea fowl, which swim in the water, and paved, if I may be allowed the expression, with *madrépores*, of the colour of the peach blossom, as well as the black rock, covered with rose-coloured *nerits*, and with shells of every kind, penetrate into the island, and reflect, like so many mirrors, all the objects of the land, and of the heavens. You would imagine that you saw the birds flying in the water, and the fishes swimming among the trees, and you would be tempted to exclaim, Behold the marriage of *Terra* and *Oceanus*, who have agreed, thus to blend, and confound their domains! In the majority even of uninhabited islands, lying between the tropics, when the discovery of them was first made, the banks of sand which surround them, were found to be filled with turtle, which came thither to deposit their eggs, and with the scarlet flamingos, which, as they sit on their nests, resemble so many burning torches. They had also, a border of mangroves, covered with oysters, which opposed their floating foliage to the violence of the waves, and of cocoa-trees, loaded with fruit, which, advancing into the very sea, along the breakers, presented to the eye of the mariner the aspect of a city, with its ramparts and its avenues, and announced to him from afar, an asylum prepared for him by the god of the waters. Those different kinds of beauty must have been common to the

Isle of France, as well as to many other islands, and were, in all probability, destroyed by the craving necessities of the first mariners who landed upon it. Such, however, is the picture, imperfectly as I have been able to represent it, of a country, of which the climate has been considered by philosophers of old, as uninhabitable, and the soil, by modern philosophers, as a scum of the ocean, or the mere refuse of volcanoes.

The second rural scenery, which I surveyed with so much rapture, and of which I shall also attempt a description, was in Russian Finland, when I was employed, in 1764, on a visitation of its fortresses, with the generals of the corps of engineers, in which I then served. We were travelling between Sweden and Russia, through a quarter so little frequented, that the firs had encroached on the great line of demarcation, which separates the boundaries of the two countries. It was impossible to pass in a carriage, and we were under the necessity of employing the peasants to cut down the trees, that our equipages might follow us. We were able, however, to penetrate, in every direction, on foot, and frequently on horseback, though we had to inspect the windings, the summits, and the smallest recesses of a great number of rocks, in order to ascertain their natural capability of defence, and though Finland is so covered with them, that ancient geographers have given it the surname of *Lapidosa*, (stony). These rocks are not only scattered about there, in large fragments, over the surface of the ground, but vallies, and entire hills are, in many places, formed of a single mass of solid rock. This rock is a soft granite, which exfoliates, and of which the scurf fertilizes the plants, at the same time, that the large masses shelter them from the north wind, and reflect on them the rays of the sun, by means of their curves, and the particles of mica with which they are filled. The bottoms of these vallies were adorned with long

borders of meadow, which every where facilitated the communication. At the places where they were pure rock, as in their original state, they were covered with a plant, called by the natives, *Kloukua*, to which rock is genial. It comes out of the clefts, and seldom rises more than a foot and a half in height, but it spreads in all directions, and extends far and wide. Its leaves and verdure resemble those of the box, and its boughs are loaded with a red berry, good to eat, resembling the strawberry.

The fir, the birch, and the service tree, vegetated on the sides of the hills with astonishing luxuriance, though, in many places, they found scarcely a sufficiency of earth in which to insert their roots. The summits of the hills, in general, were rounded in the form of a night cap, and rendered, by the water, which oozed across the long crevices that furrowed them, quite dazzling. Many of those caps were perfectly bare, and so slippery, that it was difficult to walk over them. They were crowned, in their whole circumference, with a broad belt of moss, of an emerald green, out of which started, here and there, an infinite multitude of mushrooms, of every form and colour. Some of them were shaped like large scarlet-coloured tweezer cases, studded with dots of white; others were orange-coloured, and formed like a parasol; others yellow as saffron, and of the oblong form of an egg. Some, also, were of the purest white, and so well rounded, that you would have taken them for ivory draughts'men.

These mosses and mushrooms, spreading along the threads of water, which trickled from the summits of the rocky hills, extended in long rays across the woods, with which their sides were covered, and proceeded to skirt their extremities, till they were confounded at last with a multitude of strawberry and raspberry plants. Nature, to indemnify this country for the scarcity of apparent flowers to please the eye, of which it produces but a small number, has

bestowed their perfumes on several plants, as the *calamus aromaticus*, for example, the birch, which in spring exhales a kind of odour of roses, and the fir, the apple of which is sweet-scented. She has, in like manner communicated, the most agreeable and the most brilliant colours of flowers to the most common vegetables, as to the cones of the larch, which are of a beautiful violet, to the scarlet grains of the sorb apple, to mosses and mushrooms, and even to turnip-radishes.

On the subject of this last vegetable, the accurate Corneille Le Bruyn, in his voyage to Archangel*, speaks as follows: "During our residence among the Samoiades, they brought us several sorts of turnips of various colours, and extremely beautiful. Some of them were violet-coloured, like our plums, others grey, white, yellowish, and all of them streaked with red, like vermillion or the finest lacca, and as agreeable to the eye as a pink. I painted some of them on paper in water colours, and sent others to Holland, in a box filled with dry sand, to one of my friends, who is fond of such curiosities. I carried those which I had painted to Archangel, where no one would believe they were copied after nature, till I produced the turnips themselves; a proof that no great attention is paid there to the rarest and most curious productions of nature."

I take these turnips to be of the radish sort, the bulb of which grows above ground. At least, I presume so, from the drawing itself of Corneille Le Bruyn, and from having seen vegetables of this sort in Finland. They are in taste superior to that of our colewort, and have a flavour similar to the artichoke bottom. I have produced these testimonies of a painter, and that painter a Dutchman, respecting the beauty of these various coloured vegetables, in order to cor-

* Vol. iii. page 21.

rect the prejudice which so commonly prevails, that the sun gives a magnificent colouring to plants no where but in the Indies : whereas nothing, in my opinion, equals the beautiful green of the plants of the north, in spring. I have frequently admired, in particular, the verdure of the birch, of the turf, and of the mosses, some of which are glazed with violets and purple. The solemn firs themselves, burst, at that season of the year, into festoons of the most delicate green, and when they come to throw, from the extremity of their branches, their yellow tufts of stamina, they appear like vast pyramids, loaded all over with little lamps.

We found no difficulty in traversing their forests. Sometimes there lay in the way an aged birch, laid low by the hand of time, and internally consumed by the worm ; but upon stepping on the rind it supported us like a piece of thick leather. The wood of these birches decays very rapidly, and their bark, which no moisture is able to corrupt, is carried away, on the melting of the snows, into the lakes, where it swims about in one entire piece. As to the firs, when they fall, humidity and the mosses consume them in a very little time. This country is intersected with great lakes, which every where present new means of communication, as they penetrate far into the land by their branching gulfs, and exhibit a new species of beauty, by reflecting, on their still waters, the openings of the vallies, the mossy hills, and the pendent firs bending from the promontories over their shores.

It would be no easy matter to describe the hospitable reception which we found in the solitary habitations of those northern regions. Their masters exerted themselves in every possible way, to detain us among them for many days together. They sent to the distance of ten and fifteen leagues, invitations to their friends and relations to come and assist in entertaining us. The days and nights passed away in dancing and festivity. In the towns, the principal

inhabitants regaled us by turns. It was in the midst of this hospitable conviviality, that we made the tour of the poor and destitute Finland, Wiburg, Villemansstrand, Fredericsham, Niglot, &c. The castle of this last town is situated on a rock, at the discharge of Lake Kiemen, which surrounds it with two cataracts. From its platforms you perceive the vast extent of that lake. We dined in one of its four towers, in a small apartment, of which the windows were like gunports. It was the very apartment in which the unfortunate Ivan was so long immured, who descended from the throne of the Russian empire, at the age of two years and a half. But this is not the place to expatiate on the influence which moral ideas may diffuse over landscapes.

Plants, then, are not scattered about at random upon the earth; and though nothing has been hitherto said respecting their general arrangement in different climates, this simple sketch is sufficient to demonstrate that there is order observed in their combination. If we examine, in like manner, however superficially, their expansion, their attitude, their size and proportions, we shall find, that there is as much harmony in the aggregation of their parts, as in that of their species. It is impossible, in any respect, to consider them as mere mechanical productions of heat and cold, of dryness and humidity. Our scientific systems have brought us back precisely to the opinions which precipitated barbarous nations into idolatry; as if the completion of our light and knowledge were necessarily the recommencement and return of our darkness, conformably to the well-grounded censure of the author of the Book of Wisdom. "They deemed either fire, or wind, or swift
" air, or the circle of the stars, or the violent water, or
" the lights of heaven, to be the gods which govern the
" world."*

* Wisdom of Solomon, chap. xiii. verse 2.

All these physical causes united, would not have determined the port of a single moss. To be convinced of this, let us begin with examining the circulation of plants. It has been laid down as a principle that is not to be disputed, that their saps ascend through the wood, and re-descend through the rind. To the experiments which have been detailed in proof of this principle, I shall oppose the single instance only of a great chesnut tree in the garden of the Thuilleries, near the Terrace of the Feuillans, which, for twenty years past, has had no bark round its under part, and which, notwithstanding, is in perfect vigour. Many elms on the Boulevards are in the same state. On the other hand, we have seen old hollowed willows, consisting wholly of rind, without so much as a morsel of wood. Beside, how is this principle of vegetation to be applied to a multitude of plants, of which some are composed entirely of tubes, and others have no rind, being enclosed only in dry pellicles?

The supposition that they rise in a perpendicular line, and that to this direction they are determined by the action of columns of air, is equally contrary to truth. Some, it must be allowed, follow this direction, as the fir, the stalk of corn, the reed. But a much greater number deviate from it, such as creeping plants, for instance, of every species, vines, liannes, French beans, &c. Others ascend vertically, and having arrived at a certain height, in an air perfectly unobstructed, fork off, in various tiers, and send out their branches horizontally, like the apple tree; or incline them towards the earth, like firs; or hollow them in form of a cup, like the sassafras; or round them into the head of a mushroom, like the pine; or straighten them into a pyramid, like the poplar; or roll them as wool on the distaff, like the cypress; or suffer them to float at the discretion of the winds, like the birch. All these attitudes may be seen under the same bearing of the wind. Nay,

there are some that assume forms, to which all the art of the gardener could hardly subject them. Such is the badamier of the Indies, which grows in the form of a pyramid, and is divided into stories, like the king of the chessboard. There are plants uncommonly vigorous, which, so far from pursuing the vertical line, recede from it the very moment they get above ground. Such is the false potatoe of India, which, in hot countries, loves to crawl along the sand of the shores, covering whole acres in its progress. Such too, is the ratan of China, which frequently grows in similar situations. These plants do not crawl from weakness. The scions of the ratan are so strong, that the Chinese make cordage of them for their shipping; and when they are on the ground, they serve as a trap for the deer, who find it impossible, with all their force, to disengage themselves. They are nets spread out by the hand of nature.

I should never have done, were I to run over, ever so hastily, the different sorts of vegetables; what I have said is sufficient to evince, that there is not a single one, whose direction is determined by the vertical column of the air. The mistake was occasioned by supposing that plants would naturally seek the greatest volume of air; and this error in physics, has produced another in geometry, for, on this supposition, they must all crowd toward the horizon, because there the column of air is much more considerable than in the zenith. We must in like manner reject the consequences which have been deduced from this idea, and laid down indeed as principles of jurisprudence, for the division of lands in our boasted mathematical treatises; such, for instance, as the following:—*that no more wood or grafs can grow on the declivities of a mountain, than what would grow on the area of its base.* There is not a wood-cutter nor haymaker in the world, who could not demonstrate, from his own experience, the contrary of this maxim.

Plants, it has been said, are mechanical bodies. Try, then, to construct a body so thin, so tender, so fragile, as that of a leaf, which shall, for years together, resist the winds, the rains, the keenest frost, the most ardent sun. A spirit of life, independent of all latitudes, governs plants, as well as preserves and reproduces them. They repair of themselves the injuries which they may have sustained, and skin over their wounds with a new rind. The pyramids of Egypt are crumbled into powder; but the grasses which covered the soil, in the days of its Pharaohs, subsist to this day. How many Greek and Roman sepulchres, the stones of which were rivetted with iron, have, one after another, disappeared? Nothing remains around their ruins but the cypresses which shaded them.

It is the sun, we are told, that gives existence to vegetables, and maintains that existence. But this grand agent of nature, powerful as he is, is not the only and determining cause even of their expansion. If his heat invite the majority of those of our climates to open their flowers, it obliges others to shut them. Such are, of this last description, the great night-shade of Peru, and the *arbor tristis*,—*melancholy tree*, of the Moluccas, which flower only in the night. Nay, when most remote from our hemisphere, his distance does not destroy in it the power of nature. It is then most of those moises vegetate which clothe the rocks with an emerald coloured green; it is then the trunks of trees cover themselves in humid situations, with plants imperceptible to the naked eye, called *minium* and *lichen*, which give them the appearance, in frosty weather, of columns of green bronze. These vegetations, in the very severity of winter, must overturn all our reasonings respecting the universal effects of heat, since plants of so delicate an organization would seem to require, in order to their expansion, the mildest temperature. Even the fall of the leaf, which we have been taught to consider as a certain effect of the

absence of the sun, is not occasioned by the cold. If the palm retain its foliage all the year round in the south, the fir is equally an evergreen in the north. The birch, it is true, the larch, and several other species of trees, shed their leaves in northern climates, on the approach of winter, but a similar depredation happens also to other trees in the south. It is the resinous substance, we are told, which preserves in the north the foliage of the fir; but the larch, which is likewise a resinous plant, is stripped of its foliage in winter, whereas the filaria, the ivy, the privet, and many other species, which are not resinous, continue with us in full verdure, at all seasons of the year.

Without having recourse to mechanical causes, the effects of which always contradict one another, whenever we attempt to generalize them, why not recognize in these varieties of vegetation, the constant and uniform direction of a providence? That providence has assigned to the south, trees always green, and has clothed them with an ample foliage, to shelter the animal creation from the heat. It has interfered also for the convenience and comfort of animals in other ways, by providing them with robes denuded of hair, that they may be lightly clothed; and by garnishing their habitations with green ferns and liannes to cool and refresh them. The necessities of the animals of the north have alike been remembered. It has spread as a roof over their heads, the evergreen firs, whose lofty and tufted pyramids ward off the snow from their roots, and whose branches are so abundantly furnished with long gray mosses, that the trunk is rendered thereby almost invisible; for a bed, it has provided a bank of moss on the ground, in many places more than a foot in thickness, and the soft and dry leaves of a number of trees, which fall previously to the approach of the inclement season; and for provision it has laid up in store for them, the fruits of those very trees which serve them for shelter, and which have then

arrived at their fullest maturity. To these it has added, here and there, the scarlet clusters of the sorb-apple, which, sparkling afar over the whiteness of the snows, invite the birds to an asylum; so that the partridge, the moorcock, every species of snow bird, and often the hare and the squirrel, find, under the same fir, food, lodging, and the means of protection from the cold.

But one of the greatest blessings of providence to the animals of the north, is the clothing them with furred garments of long and thick hair, which regularly grow in winter and fall off in summer. Naturalists, who consider the hair of animals as a species of vegetation, have not failed to account for this growth and decay by the influence of heat; and they adduce in support of their system, the example of the human hair and beard, which are both observed, in summer, to grow rapidly. But how is it, then, I would ask them, that, in cold countries, horses, which in summer are sleek and smooth, assume in winter a long and shaggy coat, like the fleece of a sheep? To this they reply, that it is the internal heat of their body, increased by the external action of the cold, which produces this wonderful phenomenon. Very well; for a moment this may seem plausible. But how happens it, that cold does not produce this effect on the human beard and hair, but, on the contrary, retards their growth; that, besides, in the case of animals, on which providence bestows a clothing peculiarly warm, the hair is much longer and thicker on those parts of their body that have the least natural heat, such as the tail, which, in horses, martens, foxes, and wolves, is extremely bushy; that this hair again is short and thin on the parts which have most natural heat, as the belly? Their backs, their ears, and frequently their very paws, are the parts most amply furnished with hair. But I have another question to ask these naturalists, and this is the last objection I shall make: The external and internal heat of an African lion ought

surely to be, at least, as ardent as that of a Siberian wolf; whence is it, then, that the first is smooth as if newly shaven, whereas the other is shagged even to the very eyes?

The cold which we consider as one of the greatest obstacles to vegetation, is as necessary to certain plants as heat is to others. If those of the south could not thrive in the north, those of the north would in like manner not succeed better in the south. The Dutch have made many a vain attempt to cultivate the fir at the Cape of Good Hope, in order to be provided with masts for their ships, which sell in India at an exorbitant price. Many inhabitants of the Isle of France have made attempts equally fruitless, to raise in that island the lavender, the daisy, the violet, and other plants of our temperate climates. The conquering Alexander, who removed nations of men at his pleasure, could not, with all his efforts, transplant the ivy of Greece into the territory of Babylon,* though he was ambitious of acting, in India, the character of Bacchus in the completest style. I am persuaded, however, that, by employing ice in the south for the propagation of northern plants, as we employ stoves in the north for the propagation of the plants of hot climates, these vegetable migrations might be effected. I do not believe there is a single spot on the globe, in which, with a little address and industry, ice might not be procured, as easily as we procure salt. In the whole course of my travels, I have never met with a more sultry temperature than that of the island of Malta, though I have twice crossed the line, and have passed a considerable part of my life in the Isle of France, where the sun, twice a year, is vertical. The soil of Malta consists of little hills of white stone, which reflect the rays of the sun with so much force that the sight is sensibly affected by it; and when the wind from Africa, known by the name of *Syroco*, which issues

* See Plutarch and Pliny.

from the sands of Zara, on its way to melt the ices of the north, passes over the island, the air is as hot as the breath of an oven. I recollect, in particular, a figure of Neptune, in bronze, on the sea shore, the metal of which was heated to such a degree, that it was scarcely possible to apply one's hand to it. Meanwhile, they imported into the island snow from Mount Etna, which is sixty leagues distant; they kept it for a month together, laid on straw in vaults, and it was to be bought, in common, for a farthing a pound, even at retail. Since it is possible, then, to have ice in Malta, during the dog-days, it might surely be preserved in every country of the globe. Nature, beside, as we have seen, multiplies icy mountains, in the vicinities of hot countries. I shall, perhaps, be reproached here with indicating new means for the increase of luxury; but as the commonalty now subsist entirely on the luxury of the rich, my suggestion may tend to promote, at least, the extension of the science of nature.

So far is cold from being the enemy of all plants, that it is in the north we find forests of the tallest growth, and of the greatest extent in the world. It is at the foot of the eternal snows of Mount Lebanon, and there only, that the cedar, the king of vegetables, rises in all his majesty. The fir, too, which, next to the cedar, is the largest tree of our forests, arrives at a prodigious size on icy mountains alone, and in the cold climates of Norway and Russia. Pliny tells us, that the largest piece of timber which, in his time, had ever been seen at Rome, was a vast log of fir, a hundred and twenty feet long, and two feet square, at both ends, which Tiberius had caused to be conveyed from the cold mountains of Vostolino, in Piedmont, and which Nero employed in his amphitheatre. You may judge, says he, what must have been the length of the tree, as it grew, when a cutting of it had such dimensions. However, as I conceive Pliny to be speaking of Roman feet, which are of

the same dimension as those of the Rhine, and less than ours, nearly a twelfth-part must be subtracted from this measurement. He quotes, beside, the fir mast of the vessel, which brought from Egypt the obelisk that Caligula ordered to be erected in the Vatican; this mast, he says, was four fathoms in circumference. I know not from what forest it was taken; but I have myself seen firs in Russia, compared to which those of our temperate climates are mere twigs. Among others, I remember having seen, between Petersburg and Moscow, two logs which exceeded in size the largest masts in our ships of war, though these consist of several pieces. They were cut from the same tree, and served as mounting blocks at the gate of a farm yard. The boats, which convey provisions from the Lake of Ladoga to Petersburg, are scarcely smaller than those which ply between Rouen and Paris, and they are constructed of fir planks, from two to three inches thick, sometimes two feet broad, and of which the length is that of the whole barge. The Russian carpenters of the cantons, where they are built, make only a single plank out of one tree, timber being so abundant that they do not take the trouble, as we do, to saw it into different planks, in order to make the most of it.

Before I travelled into the north, I had supposed, in conformity to the laws of our physics, that the earth must there be stripped of every thing resembling vegetation, by the rigour of the cold; accordingly, I was very much astonished to find in those countries the largest trees I had ever seen in my life, and growing so near to each other, that a squirrel might traverse a considerable part of Russia without touching the ground, by springing from branch to branch. This forest of firs covers Finland, Ingria, Estonia, the whole space comprehended between Petersburg and Moscow, and thence extends over a great part of Poland, where oaks begin to appear, as I know from actual observ-

ation, having myself travelled through these countries. But what I have seen, is but the smallest part of these immense forests, for it is well known, that they extend from Norway all the way to Kamschatka, some sandy deserts excepted, and from Breslaw to the shores of the frozen ocean.

I shall conclude this article with refuting an error alluded to in the preceding study; namely, that cold is diminished in the north, in proportion as the forests are cut down. As this position has been advanced by some of our most celebrated writers, and afterwards retailed, as the custom is, by a multitude of others, it is of importance to overturn it, since it is a prejudice highly injurious to rural economy. I had long adopted it myself, on the faith of history; and when, at length, I changed my opinion, it was not by books that the conviction was wrought in me, but by simple peasants.

One day in summer, about two o'clock in the afternoon, being about to cross the forest of Ivry, I saw some shepherds with their flocks, who kept at a considerable distance from it, reposing under the shade of some trees that were scattered, here and there, through the country. I asked them, why they did not go with their flocks to take shelter from the heat of the sun, in the forest. They told me, it was too hot there, at that time of the day, and that they never drove their sheep there, except in the morning and evening. Being desirous, however, of traversing, in broad day, the woods in which Henry IV. had hunted, and of arriving betimes at Anet, to take a view of the country palace of Henry II. and of the tomb of Diana of Poitiers, his mistress, I engaged a lad, belonging to one of the shepherds, to attend me as a guide, which was a very easy matter to him, as the road leading to Anet crosses the forest in a straight line, though, on that side, it is so little frequented, that I found it covered, in many places, with tufts

of grafs, and strawberry plants. All the way, as I walked, I was oppreffed by a fuffocating heat, and which was alfo much more ardent than what I had experienced in the open country; nor was it till I had got fairly out of the cover, and had made my efcape from the edge of the foreft, more than the diftance of three mufket fhots, that I began to refpire freely. In other refpects, the fhepherds, the folitude, the f Silence of the woods, blended with the recollection of Henry IV. appeared to me much more affecting and fublime, than the emblems of the chafe, in bronze, and the cyphers of Henry II. interwoven with the crefcents of Diana, which embellish, on all fides, the domes of the caftle of Anet. This royal refidence, encumbered with ancient trophies of love, infpired, at firft, a mixed emotion of pleafure and penviveness, which gradually fubfided into profound melancholy, on recollecting, that the love was illicit; but this melancholy was, at laft, diffipated by fentiments of veneration and refpect, which took complete poffeffion of my mind, on being informed, that, by one of thofe revolutions to which the monuments of men are fo frequently fubjected, the caftle was then inhabited by the virtuous duke of Penthièvre.

I have fince reflected on what the fhepherds told me, refpecting the heat of the woods, and on what I had myfelf experienced, and I have in fact remarked, that, in the fpring, all plants are more forward in the vicinity of woods, and that you find violets in flower on their borders, much earlier than you gather them on the open plain, or on a naked hill. Forefts, then, fhelter land from cold, in the north; but what is equally wonderful, they fhelter it likewife, in warm countries, from the heat. Thefe two oppofite effects are produced entirely by the different forms and difpofition of their leaves. In the north, the leaves of the fir, the larch, the pine, the cedar, the juniper, are fmall, gloffy, and varnifhed: their delicacy, their varnifh, and the

endless variety of their planes, reflect the heat around them, in a thousand different ways; they produce nearly the same effect as the hair of the animals of the north, whose furs are warm in proportion as the hair is fine and glossy. Beside, the leaves of some species, as the fir and the birch, are perpendicularly suspended from the branches, by long moveable membranes, so that with every whisper of the wind, however gentle, they reflect all around the rays of the sun, like so many mirrors. In the south, on the contrary, the palms, the tallipot, the cocoa, the banana, bear large leaves, which, on the side next the ground, are rather rough than glossy, and which, spreading horizontally, form a deep shade below, where not the least degree of heat is reflected.

I admit, however, that the clearing away of forests, dispels the coldness occasioned by humidity; but it increases the dry and sharp colds of the north, as has been found on the lofty mountains of Norway, which were formerly cultivated, but are now uninhabitable, because they are completely stripped of their woods. This clearing of the ground, likewise increases the heat in warm countries, as I have had occasion to observe in the Isle of France, on several parts of the coast, which are become so parched, since every kind of tree has been destroyed, that they are to this day perfectly destitute of culture. The very grass, even, which shoots up with some degree of vigour during the rainy season, is, in a little time, entirely burnt up again by the sun. What is still worse, there results from this parchedness of the coasts, the drying up of a great many rivulets, for the trees, planted on the heights, attract thither the humidity of the air, and fix it, as we shall see in the study on plants. Beside, by destroying the trees, which grow on the heights, you rob the vallies of their natural manures, and the plains of the pallisades, which shelter them from the bleak winds. These winds desolate,

to such a degree, the cultivation, in many places, that nothing can be made to grow. It is to this last imprudence I attribute the sterility of the heaths in Britany. In vain have we attempted to recover their ancient fertility; our efforts must always be abortive, till we first restore to them their shelter and their temperature, by re-sowing the forests. But there is a requisite, prior even to this, which is that of rendering happy the peasants, who cultivate them; for the prosperity of a country depends, above all things, on that of its inhabitants.

STUDY VI.

ANSWER TO THE OBJECTIONS AGAINST PROVIDENCE
FOUNDED ON THE DISORDERS OF THE ANIMAL
KINGDOM.

TO refute the prejudice, which would ascribe the principle of life, in plants and animals, solely to the heat of the south, the fecundity of northern regions must still be the subject of our reasoning. And here I could expatiate on the numerous and extensive chases of elks, rein-deer, water-fowls, heath-cock, hares, white bears, wolves, foxes, martens, ermines, beavers, &c. which the inhabitants of the northern districts annually carry on, the very clothing of which, above what they employ for their own use, supplies them with a very considerable branch of commerce, for the markets of all Europe. But I shall confine myself entirely to their fisheries, because these precious

gifts of the waters are presented to all nations, and are no where so abundant as in the north.

From the rivers and lakes of the north are extracted such incredible multitudes of fishes, that John Schœffer, the accurate historian of Lapland, tells us,* that they catch annually at Torneo, no less than thirteen hundred boat-loads of salmon; that the pike there grows to such a size, that some are found as long as the human stature, and that every year they salt as many as are sufficient for the support of four kingdoms of the north. But these fisheries, however productive, will bear no comparison with those of the seas.† From the bosom of the sea is dragged the enormous whale, which is usually about sixty feet in length, twenty feet broad over the body, and at the tail, eighteen feet high, and which yields no less a quantity than a hundred and thirty barrels of oil. The fat is two feet thick, and in cutting it off, they are under the necessity of using knives of the enormous size of six feet long. From the seas of the north, annually take their departure innumerable shoals of fishes, sufficient to enrich all the fishers of Europe; such as cod, anchovies, sturgeon, dory, mackarel, pilchers, herrings, belugas, puffers, saw-fish, porpoises, sea-dogs, sea-horses, sea-unicorns, &c. The size of all these fishes is considerably larger than in temperate latitudes, and they are divided into much more numerous species. There are no less than twelve different kinds of whales, and plaice are caught in those seas of the enormous weight of four hundred pounds. I shall, however, confine myself to those which are best known to us, as herrings for example, of which the seas of the north every year send out a quantity more than sufficient to feed all the inhabitants of Europe. This is a fact that cannot be disputed.

* History of Lapland by John Schœffer.

† Consult Frederic Martens of Hamburg.

We are in possession of memoirs which prove that the herring fishery was carried on so far back as the year 1163, in the straits of the Sound between the province of Schonen and the island of Zealand. Philip de Mésières, governor to Charles VI. relates, in the *Old Pilgrim's Dream*, that, in the year 1389, during the months of September and October, the quantity of herrings in those straits was so prodigious, that, "for several leagues together, you might have cut them with a sword, and it is commonly reported, that there are forty thousand boats which are employed in nothing else, for two months, but catching herrings; each boat containing at least six persons, and many not less than ten; and beside these, there are five hundred great and small vessels of burden, employed wholly in collecting and salting these herrings, and putting them in barrels." He makes the number of persons engaged in this fishery to amount to three hundred thousand, Prussians and Germans. In 1610, the Dutch, who carry on the herring fishery still farther to the north, where the fish is better, employed in it three thousand boats, and fifty thousand fishermen, without reckoning nine thousand other vessels, employed in barrelling and conveying them to Holland, and a hundred and fifty thousand persons, partly at sea, partly on shore, engaged in the carrying trade, and in preparing and selling. At that period they derived a revenue from it of two millions six hundred and fifty thousand pounds sterling. I have myself witnessed in Amsterdam, in 1762, the joy of the populace, who placed streamers and flags over the shops where this fish was exposed to sale, on the first arrivals; and this was the case in every street. I was informed in that city, that the company established for carrying on the herring fishery, was richer, and fed more mouths, than even the East India Company. The Danes, the Norwegians, the Swedes, the Hamburgers, the English, the Irish, and some traders of the ports of France, particu-

larly of Dieppe, fitted out vessels for this fishery; but in too small a number for a fall of manna so plentiful and so easily gathered.

In 1782, at the mouth of the Gothela, a small river which washes the walls of Gottenburg, one hundred and thirty nine thousand barrels were cured by salt; three thousand seven hundred were smoaked; and two thousand eight hundred and forty five casks of oil were extracted from what could not be preserved. The Gazette of France,* which contains an account of this fishery, remarks, that, previous to 1752, this species of fish had intirely disappeared for seventy-two years together. I ascribe their desertion of this coast to some naval engagement, which had chased them away by the noise of the artillery, as is the case with the turtle of the island of Ascension, which forsake the roads for weeks together, when vessels, passing that way, discharge their guns. It may, perhaps, be likewise accounted for from a conflagration of the forests, which might have destroyed the vegetables that attracted them to the coast. The good bishop of Berghen, Pontoppidan, the Fenelon of Norway, who introduced into his popular sermons complete tracts of natural history, considering them as excellent articles of theology, relates,† that, when the herrings coasted along the shores of Norway “ the whales, which pursue “ them in great numbers, and which dart their water spouts “ into the air, give to the sea, at a distance, the appearance “ of being covered over with smoking chimnies. The “ terrified herrings throw themselves close in shore, into “ every little bay and creek, where the water, before tran- “ quil, forms considerable swellings and surges wherever “ they croud to make their escape, and they are in such “ quantities, that you may take them out in basket’s full,

* Friday, 11th October, 1782.

† See his Natural History of Norway.

" and the country people can even catch them with the " hand." After all, however, that the united efforts of all these fishermen can effect, hardly any impression is made on their great general column, which coasts along Germany, France, Spain, and stretches as far as the Straits of Gibraltar, devoured, the whole length of their passage, by an innumerable multitude of other fishes and sea-fowls, which follow them night and day, till the column is lost on the shores of Africa, or returns, as other authors tell us, to the climates of the north.

For myself, I no more believe that the herrings return to the seas from which they came, than that the fruits re-ascend the trees from which they have once dropped. Nature is so magnificent in the entertainments which she prepares for man, that the same dishes are never served up by her a second time. I presume, conformably to an observation of Father Lamberti, a missionary in Mingrelia, that these fishes accomplish the circuit of Europe, by entering the Mediterranean, and that the extreme boundary of their emigration is the extremity of the Black Sea; and this is the more probable, as the pilchers, which take their departure from the same places, follow the same track, as is proved by the successful fisheries of them carried on along the coasts of Provence and Italy. " A multitude of herrings," says Father Lamberti,* " is sometimes seen in the Black Sea; " and in the years when this happens, the inhabitants of the " adjacent countries derive from it a flattering prognostic of " a plentiful sturgeon season; on the contrary, when the " herrings fail to make their appearance, the opposite conclusion is drawn from it. There was seen, in 1642, so " prodigious a quantity of them, that, the sea having " thrown them on the shallows which separate Trebisond " from the country of the Abcasses, the whole was covered

* Account of Mingrelia, Thevenot's Collection.

“ and surrounded with a bank of herrings, which was, at
“ least, three hands breadth high. The people of the
“ country were under dreadful apprehensions, that the air
“ would be poisoned by the corruption of these fishes; but
“ they were presently followed by enormous flocks of crows
“ and rooks, which ate up the herrings, and thus ridded the
“ inhabitants of their terror. The natives speak of a
“ similar appearance before that period, but the quantity
“ appears to have been much inferior.”

This immense number of herrings is undoubtedly matter of astonishment; but how is that astonishment increased, when it is considered, that this column is not the half of what annually issue from the seas of the north. They separate at the northern extremity of Iceland, and, while one division proceeds to diffuse plenty over the coasts of Europe, the other hastens alike to convey it to the shores of America. Anderson informs us, that herrings are so abundant on the coasts of Iceland, that a shallop can with difficulty force its way through the shoal by dint of rowing. They are accompanied by an incredible multitude of pilchers and cod, which renders fish so plentiful on the island, that the inhabitants have them dried and reduced to powder with a grindstone to convert them into food for their oxen and horses.

Father Rale, a Jésuit, and an American missionary, speaking of the savages who inhabit between Acadia and New England, tells us, “ That they resort, at a certain
“ season, to a river, not far distant, where, for the space of a
“ month, the fishes ascend the stream in such quantities,
“ that, with hands sufficient, fifty thousand barrels might
“ be filled in a single day. These are a species of very
“ large herrings, that, when fresh, are extremely agreeable
“ to the taste. They are crowded upon each other to the
“ thickness of a foot, and are taken out by pails full, like

" water. The savages dry them for eight or ten days, and
 " live upon them during the whole season of sowing their
 " lands."

This testimony is confirmed by a great many others, and particularly by a gentleman of English extraction, but a native of America, who has favored us with a history of Virginia. " In spring," says he,* " herrings ascend in such quantities along the rivulets and fords of rivers, that it is almost impossible to pass on horseback without trampling on them. Hence it happens, that, at this season of the year, those parts of the rivers where the water is fresh are rendered fetid. Beside herrings, an infinite number of shads, roach, sturgeon, and a few lampreys also may be seen, which find their way from the sea to the rivers."

It would seem as if another column of those fishes issued from the north pole to the east of our continent, and passed through the channel which separates America from Asia; for we are informed by a missionary, that the inhabitants of the land of Yafso, go to Japan, to sell, among other dried fishes,† herrings also. The Spaniards, who have been attempting discoveries to the north of California, find all the nations of those regions to be fish-eaters, and unacquainted with every kind of cultivation. Though they landed there only in the middle of summer, before the fishing season, probably, had yet commenced, they found pilchers in the greatest abundance, the native country and emigrations of which are the same as the herring, for vast quantities of a smaller size are taken at Archangel. I have eaten of them in Russia, at the table of Mareschal Count Munich, who called them the anchovies of the north. As the northern seas, however, which separate America from Asia are but little known to us, I shall pursue this fish no

* History of Virginia, page 202.

† Ecclesiastical History of Japan, by Father F. Salier, book xix. chap. xi.

further. Meanwhile, I must observe, that more than half of these herrings are filled with eggs, and if the propagation were to go on to its full extent, for three or four generations only, without interruption, the ocean itself would be unable to contain them. It is obvious to the eye, from the roe of this fish, that it produces, at least, as many eggs as the carp. Now, Mr. Petit, a celebrated practitioner in surgery and medicine, has found, by experiment, that the two parcels of eggs of a carp eighteen inches long, weighed eight ounces, two drams, which make four thousand seven hundred and fifty-two grains; and that it required seventy-two of these eggs to make up the weight of one grain, which gives a product of three hundred and forty-two thousand one hundred and forty-four eggs, contained in a single roe, weighing eight ounces and two drams.

I have been a little diffuse on the subject of this particular species of fish, not for the benefit of our commerce, which, by its offices, its bounties, its privileges, and its exclusions, renders every article scarce, with which it intermeddles; but in compassion to the poorer part of the community, reduced, in many places, to subsist entirely on bread, while Providence is bestowing on Europe, in the richest profusion, the most delicate fish that, perhaps, swims in the sea.* We are not to form our judgment from those that are brought to Paris, after the season is over, and which are taken on our own coasts; but from those which are caught far to the north, known, in Holland, by the name of *pickled herrings*, which are thick, large, flat, with the flavour of a nut, and so delicate and juicy, that they melt away in the cooking, and are eaten raw from the pickle, as we eat anchovies.

* More than one epicure has already made this observation; but I can tell them of another, which few are disposed to acknowledge: it is this, that in all cases, and in all countries, *the most common things are the best*.

The South Pole is not less productive of fishes than the North. The nations which are nearest to it, such as the inhabitants of the Islands of Georgia, of New Zealand, of Mairés Strait, of the Terra-Del-Fuego, and of the Magellan's Strait, live on fish, and actually practice no kind of agriculture. The Chevalier Narbrught, who never lies, says, in his Journal of a Voyage to the South Seas, that Port Desire, which lies in $47^{\circ}.48'$ south latitude, is so filled with penguins, sea calves, and sea lions, that any vessel touching there, may find provisions in abundance. These animals, which are there uncommonly fat, live entirely on fish. When he was in Magellan's Strait, he caught, at a single draught of the net, more than five hundred large fishes, resembling the mullet, as long as a man's leg, smelts, twenty inches long, and a great quantity of fish, called the anchovy. In a word, they found such a profusion of every kind, that they ate nothing else during their stay. The beautiful mother-of-pearl shells, which enrich our cabinets under the name of the Magellan oyster, are there of a prodigious size, and excellent to eat. The lempit, in like manner, is of an uncommon magnitude. He adds, that on these shores, an infinite number of fishes is absolutely necessary, to support the sea calves, the penguins, and the other fowls, which live solely on the tenants of the sea, and which are all equally fat, though their number is beyond computation. They one day killed four hundred sea lions in the space of half an hour. Of those, some were eighteen feet long. Those which are only fourteen, swarm by thousands. Their flesh is as tender and as white as a lamb, and of an excellent flavour, when fresh, but, when kept for a while in salt, of a still better. Upon this circumstance, I beg leave to make a single observation, which is this, that the fish of cold countries only take salt easily, and retain in their salted state a part of their flavour: as if nature had intended, by means of this quality, to

communicate to all the nations of the globe, the abundance of the fisheries which issue from the frigid zones.

The western coast of America, in the same latitude of which we have been speaking, is not less amply supplied with fish. "Along the whole sea coast" says the Peruvian Garcillafso de la Vega,* "from Aréquipa to Tarapaca, a tract of more than two hundred leagues in length, they employ no other manure to dung the land, than the excrement of certain fowls, called sea-sparrows, of which there are flocks so numerous, as to exceed all belief. They inhabit the desert islands on the coast, and, by the accumulation of their ordure, whiten them to such a degree that, at a distance, you would take them for mountains covered with snow. The Incas reserved to themselves these islands, in order to dispose of them as a boon to whatever province they should think fit." Now this dung was the produce of the fishes, on which the fowls in question constantly fed. "In other countries, on the same coast," says he, "such as that of Atica, of Atitipa, of Villacori, of Malla, of Chilea, they dung the land with the heads of pilchers, which they sow there in great quantities. They put them in the ground, at a small distance from each other, accompanied with a few grains of maize. At a particular season of the year, the sea throws upon the shore such quantities of live pilchers, that they have an abundant supply both for food and manure; so abundant, indeed, that after these demands were satisfied, they could easily load whole ships with the overplus."

It appears, that the coast of Peru is nearly the boundary of the emigration of the pilchers, which set out from the south pole, as the coasts of the Black Sea are the boundary of that of the herrings, which issue from the north pole. These two routes, with their windings, that of the pilchers

* History of the Incas, book v. cap. lii.

of the south, and that of the herrings of the north, are nearly of the same length, and their destinies also are, in the end, similar. It would seem as if certain nereïds were annually commissioned to conduct from the poles, those innumerable swarms of fishes, to furnish subsistence to the inhabitants of the temperate zones; and that, having arrived at the termination of their course, in the hot latitudes, where fruits are produced abundantly, they empty what remain in their nets upon the shore.

It will be a less easy task, I am aware, to reconcile with the beneficence of nature, the wars which animals wage with each other. Why, it is said, should beasts of prey exist? Supposing me incapable of resolving this difficulty, is nature to be accused of cruelty, because I am deficient in knowledge and ability? She has arranged what we know of her works with such consummate wisdom, that we are bound to give her credit for the same character where her ways are to us past finding out. I will, however, declare my opinion, without fear, and attempt a reply to this question; and so much the rather, as it affords me an opportunity of presenting some observations, which I consider at least to be new, and perhaps not unworthy of attention.

First, then, beasts of prey are necessary. What, otherwise, would become of the carcasses of so many animals, which perish both on the land and in the water, and which they would consequently poison with infection. Several species of carnivorous animals, it must be allowed, devour their prey while yet living. But who can tell whether, in this, they do not transgress the law of their nature? Man knows but little of his own history: how then should he know that of the beasts? Captain Cook observed, in a desert island of the Southern Ocean, that the sea-lions, the sea-calves, the white bears, the sots, the eagles, the vultures, lived in perfect concord, no one tribe giving the least annoyance to the other. I have observed a similar good

understanding among the fool and the frigate, of the island of Ascension. After all, however, we have no great reason to compliment their moderation. It is merely an association of plunderers, corsairs among corsairs, living in harmony together, at the expence of the fishes, which they all, without remorse, gulp down alive.

Let us revert to the grand principle of nature, who has made nothing in vain. She destines a very small number of animals to die of old age; nay, I believe, that she permits man alone to complete his full career of life, because his old age alone can be useful to his fellow-creatures. Of what avail, among the brute creation, would be grandsires without reflection, to progeny brought into existence in the maturity of their experience? On the other hand, what assistance could decrepit parents find among children, which abandon them the instant they have learned to swim, fly, or walk? Old age would be to them a burden, from which they are delivered by the ferocious animals. Beside, from generations without extinction, would arise a posterity without end, which the globe is not sufficient to contain. The preservation of individuals would involve the destruction of species.

But animals, I shall be told, might always live in numbers proportioned to the places which they inhabit. In that case, however, they must cease to multiply; and then farewell the loves, the nests, the alliances, the foresight, and all the harmonies which subsist among them. Every thing that is born, is doomed to die. But nature, in devoting them to death, takes from them that, which would render the approach of it cruel. It is usually in the night, and in the hour of sleep, that they sink under the fangs and teeth of their destroyers. Twenty strokes, sent home at once to the sources of life, afford no leisure to reflect that they are going to lose it. That fatal moment is unaccompanied to them by any of the feelings which render it so bitter to the

majority of mankind; regret for the past, and solicitude about the future. Their unanxious spirits vanish into the shades of night, in the midst of a life of innocence, and frequently during the indulgence of the fond illusions of love.

Unknown compensations may, perhaps, farther sweeten their last passage. I shall observe, at least, as a circumstance deserving the most attentive consideration, that the animal species whose life is sacrificed to the support of that of others, such as insects, for instance, do not appear endowed with any sensibility. If the leg of a fly happen to be torn away, he goes and comes as if he had lost nothing: the amputation of so considerable a limb is followed by no fainting, or convulsion, or scream, or symptom of pain whatever. Children of cruel dispositions amuse themselves with thrusting straws into their anus; they rise into the air thus impaled, they walk about, and perform all their usual motions without seeming to regard it. Others take a chafer, tear off a large limb, run a pin through the nerves and cartilages of the thigh, and attach it, with a slip of paper, to a stick. These unfeeling insects fly humming round and round the stick unweariedly, and without any appearance of suffering. Reaumur, one day, cut off the fleshy and muscular horn of a large caterpillar, which continued to feed on, as if no mutilation had taken place. Is it possible to suppose that beings, so tranquil in the hands of children and philosophers, should undergo any sensation of pain, when they are gobbled down in the air by the birds that feed upon them?

These observations might easily be extended farther; particularly to that class of fishes possessing neither bone nor blood, which is the case with the majority of the inhabitants of the seas; and which appear to be equally devoid of sensibility. I have seen, between the tropics, a tunny, from the nape of whose neck, one of the sailors

scooped out a large slice of the flesh with a stroke of the harpoon, which was forced backward to his head ; and yet he followed the ship for several weeks, and was outdone by no one of his companions either in speed or in playfulness. I have seen sharks also, after being struck with musket balls, return to bite at the hook from which they had just before escaped, with their mangled throat.

We shall find a still greater analogy between fishes and insects, if we consider that neither have bones nor blood ; that their flesh is impregnated with a glutinous liquid, and which likewise appears to be the same in both, from its emitting the same odour when burnt ; that they do not respire at the mouth, but by the sides, insects by the trachea, fishes by the gills ; that they have no auditory organ, but hear by means of the nervous impression made on their bodies by the commotion of the fluid element in which they live ; that they see all round the horizon, from the disposition of their eyes ; that they equally run to the light ; that they discover the same greediness, and are, for the most part, carnivorous ; that in both genera the female is larger than the male ; that they lay their eggs to an infinite number, without sitting on them ; that most fishes pass, on their birth, through the state of insects, issuing from their eggs in the form of worms, and even some in that of frogs, such as a species of fish in Surinam ; that both are cased in scales ; that many fishes are provided with beards and horns, like insects ; that both the one and the other contain in their categories, an incredible variety of forms, peculiar to themselves : in a word, the constitutions, the metamorphoses, the manners, and the fecundity of these two grand classes of animals being the same, we are disposed to ascribe to them the same insensibility.

As to animals which have blood, let Mallebranche say what he will, they are certainly sensible ; and they express their sense of pain by the same signs as we do. But nature

has fortified them with thick hides, with long hair, or with a plumage, which protect them against blows from without : and they are, beside, little exposed to cruel treatment, except from the hands of unfeeling men.

But let us pass on to the generation of animals. We have seen, that the largest and most numerous species, both in the animal and vegetable kingdoms of the globe, are produced in the north, independently of the heat of the sun : let us now enquire, whether the prolific power of fermentation be greater in the south. Certain Egyptians told Herodotus, that particular species of animals were formed of the fermented mires of the ocean and of the Nile. Whatever respect I may have for the ancients, I must object to their authority in physics. Most of their philosophers sufficiently resemble our own : that is, they observed little, and reasoned much. If some of them, to tranquilize the minds of voluptuous princes, have advanced, that every thing proceeded from corruption, and returned to corruption again ; others, more honest, have refuted these opinions, even in the earliest times. Corruption not only produces no living body, but is fatal to all, especially to those which have blood, and chiefly to man. No air is unwholesome, but where there is corruption. How could such a principle have generated in animals feet, provided with toes, nails and claws ; skins, clothed with so many sorts of hair and plumage ; jaws, pallisadoed with teeth, cut out into a form adapted, some for cutting, and others for grinding ; heads, adorned with eyes, and eyes furnished with lids, to defend them from the sun ? How could the principle of corruption have collected these scattered members ; united them by nerves and muscles ; supported them by boney substances, fitted with pivots and hinges ; fed them with veins, filled with a blood which circulates, whether the animal be in motion or at rest ; covered them with skins so admirably provided with hairy furs, adapted to the climates which

they inhabit ; how, afterwards, have made them move, by the combined action of a heart and a brain, and given to all these machines, produced in the same place, and formed of the same slime, appetites and instincts so intirely different? How could it have inspired them with consciousness, and kindled in them the desire of reproducing themselves by any other method than that which originally gave them existence? Corruption, so far from giving them life, must have taken it away, for it generates tubercles, inflames the eyes, dissolves the blood, and produces, in most animals that inhale its emanations, an infinite number of diseases.* The

* Of all corruptions, that of the human flesh is most dangerous. Of this a very singular instance is related by Garcillaso de la Vega in his History of the Civil wars of the Spaniards in the Indies, vol. x. part iii. chap 42. He observes, first, that the Indians of the islands of Barlovento poison their arrows by plunging the points of them into dead bodies; and then adds " I shall relate what I myself saw happen, respecting one of the quarters of the dead body of Carvajal, which was exposed on the great road to Collasuyu to the south of Cusco. We set out a walking one Sunday, ten or twelve schoolfellows of us, all of a mixed breed, that is the progeny of Spanish men by Indian women, and the oldest not above twelve years of age. Having observed, as we went along, one of the quarters of Carvajal's body, at a little distance, we took it into our heads to go and look at it, and having arrived at the place, we found it was one of his thighs, the fat of which had dropped to the ground. The flesh was greenish and intirely corrupted. While we were examining the mournful spectacle, a forward boy chanced to say, I could wager something there is not one among us that dares to touch it; another replied that he would. At last the hardest of all, whose name was Bartholomew Monedero, conceiving it to be an act of courage, plunged the thumb of his right hand into this putrid limb, which it easily penetrated. This temerity astonished us so extremely that we all run away from him, for fear of infection, calling out, ' O abominable, Carvajal will make you pay dear for your rashness!' He went, however, instantly to the brook which was close by the spot, washed his hand several times, rubbing it over with clay; and this done he returned home. Next day he appeared at school, where he showed us his thumb, which was swollen prodigiously; but towards evening the hand had become inflamed as far as the wrist; and the next day, which was Tuesday, the arm had swelled up to the elbow, so that he was reduced to the necessity of disclosing the case to his father.

fermentation of any substances whatever, could have formed no one animal, nor even the egg from which it issued. We find in the dunghills of our great towns, where so many substances ferment, organic particles of every species, intire carcases of animals, blood, plants, salts, oils, excrements, spirits, minerals, substances more heterogeneous, and more combined by the caprices of man, in a state of society, than ever the waves of the ocean accumulated and confounded on its shores; yet there was never found there a single organized body. It must not be affirmed that the heat necessary to their expansion is wanting in those dunghills, for it exists there in every possible degree, from ice, even to fire. Salts crystallize in them, and sulphurs are

" Professional men were immediately called in, who bandaged the arm
 " tightly above the swelling, and applied every remedy which art and ex-
 " perience could suggest to counteract the poison. After all, however, it
 " nearly cost the patient his life; and he did not recover without suffering
 " intolerable pain, after having been for four months so enfeebled as to be
 " incapable of holding his pen."

We may conclude from this anecdote how dangerous the putrid emanations from our church-yards must be to the inhabitants of cities. Parish churches, in which so many corpses are interred, become impregnated with an air so corrupted, especially in spring when the ground begins to be warm, that I consider it as one of the chief sources of the small pox, and of the putrid fevers which are prevalent at that season of the year. An unsavoury smell then issues from it, which makes the stomach rise. I have felt this to an insufferable degree in some of the principal churches of Paris. This smell is extremely different from that produced by a croud of living people, for we are affected with no such sensation in the churches of convents where few only are interred.

It would be a curious subject, and well worthy the attention of anatomists, to enquire why the putrefaction of dead bodies should destroy the animal economy of most beings, while it makes no derangement in that of carnivorous animals. Many species of insects and fishes live on carrion. I remark that the majority of these have no blood, which is the first fluid that corruption lays hold of, and that the apertures through which they breathe are not the same with those by which they take in their food. But these reasons, it must be allowed, are inapplicable to vultures, ravens, and other birds of prey.

formed. There was picked up in Paris itself, some years ago, sulphur formed by nature in ancient dunghills in the time of Charles IX. We see every day that fermentation may be excited in dung to such a degree as to make it catch fire. Nay, its moderate heat is so favorable to the expansion of germs, that it is employed for the hatching of chickens. But the combinations of all these substances never produced any thing either living or organized. What do I say? The first operations of nature, which we are attempting to explain, are covered with so many mysteries that if the smallest aperture be made in an egg, it instantly loses its prolific virtue, the slightest contact with the exterior air is sufficient to extinguish in it the first lineaments of life. It is neither the matter, then, nor the degrees of heat which are wanting to man to imitate nature in the pretended creation of beings; and this power, always young and always active, has by no means exhausted itself, for we see it constantly exerted in their reproduction; which is a display of omnipotence equally great with that of conferring on them their primitive existence.

The wisdom with which she has regulated their proportions is not less worthy of admiration. On a careful examination of animals we shall find, that not a single individual is deficient in its members, if we consider its manners and the situation in which it is destined to live. The large and long bill of the toucan, and his tongue, formed like a feather, were necessary to a bird that hunts for insects, scattered under the humid sands of the American shores. It was necessary that he should be provided, at once, with a long mattock with which to dig, a large spoon to collect his food, and a tongue, fringed with delicate nerves, to enjoy the relish of it. Long legs and a long neck were in like manner necessary to the heron, the crane, the flamingo, and other birds, which have to walk in marshy places, and to seek their prey in the beds of the water.

Every animal has the feet, the mouth, or the bill, that are best adapted to the soil which it has to tread, and the food by which it is to be supported. It is from the different configurations of these, that naturalists derive the characters which distinguish animals of prey, from those which are frugivorous. These organs have never been wanting to the necessities of the animal creation, and are themselves as indelible as its instincts. I have seen, in the inland part of the country, ducks brought up at a distance from water for several generations, which retained on their feet, notwithstanding, the broad membranes of their species, and which, on the approach of rain, clapped their wings, cried aloud, called upon the clouds, and seemed to complain to heaven of the injustice of man, who had banished them from their natural element. No animal is destitute of a single necessary member, or is encumbered with one that is superfluous. Some philosophers have considered the spurs appended to the heels of the hog, as useless, because they do not bear upon the ground; but this animal, destined to live in swampy places, where he delights to wallow, and to make with his snout deep trenches in the mire, would frequently sink, from the impulse of his gluttony, had not nature placed above his heels, two prominent excrescences, which assist him in getting out again. The ox, who frequents the marshy banks of rivers, is provided with nearly similar weapons. The hippopotamus, who lives in the water and upon the borders of the Nile, is furnished with a cloven foot, and, above the pastern, with two small horny substances which bend backwards as he walks, so that he leaves on the sand an impression, which one would suppose to have been made by the pressure of four paws. A description of this amphibious animal may be seen at the end of Dampier's Voyages.

How was it possible for enlightened men to misunderstand the use of these accessory members, the form of which

is imitated by the peasants in some of our provinces, in their stilts; which, from this very resemblance, are denominated *bogs feet*, and which they employ in wading through marshy grounds. These same peasants have, in like manner, imitated the pointed and divergent spurs of the goat's foot, which assist this animal in scrambling over the rocks, in their pikes, shod with two iron points, contrived to prevent the backward motion of loaded carriages on the declivity of mountains. Nature, who varies her means with the obstacles to be surmounted, has bestowed these appendages on the heels of the hog, for the same reason that she has clothed the rhinoceros with a hide rolled up in several folds, in the midst of the torrid zone. This clumsy animal has the appearance of being covered with a threefold mantle, but, being destined to live in the miry morasses of India, where he grubs up with his horny snout the long roots of the bamboo, he would have been in danger of sinking, from his enormous weight, had he not been endowed with the strange faculty of extending, by blowing himself up, the multiplied folds of his skin, and of rendering himself lighter, by occupying a larger space. What, to us, would appear, at first, a deficiency in animals, is, in reality, a most wonderful compensation of providence; and it would be departing from her general laws, if she had any other views, in her contrivances, than the utility and happiness of the beings which she has formed. Hence she has given to the elephant a proboscis, which serves him, like a hand, in scrambling over the roughest mountains, where he delights to live, and in picking up the grass of the field, and gathering the foliage of the trees, which the thickness and inflexibility of his neck would otherwise not permit him to reach.

She has in like manner as infinitely varied, among the animal tribes, the means of defence as the means of subsistence. It is impossible to suppose that those, which are slow in their motions, or which scream violently, are in a

state of habitual suffering, for, in that case, how could a race of creatures, always sickly, perpetuate itself, and even become one of the most universally diffused of the whole Globe. The sluggard, or sloth, is found in Africa, in Asia, and in America. His tardiness is no more a paralytic affection, than that of the tortoise and of the snail. The cries which he utters, when you approach him, are not the cries of pain. But, among animals, some being destined to roam over the earth, and others stationed, as it were, to a particular post, their means of defence are varied with their manners. Some elude their enemies by flight, others repel them by hissings, by hideous figures, by poisonous smells, or lamentable cries. There are some which deceive the eye, as the snail, for instance, which is of the colour of the walls, or else of the bark of trees, to which he retires for refuge; others, by a magic altogether inconceivable, transform themselves, at pleasure, into the hues of the surrounding objects, as the cameleon. How steril is the imagination of man, compared to the intelligence of nature! He has produced no one thing, of any species whatever, of which he has not borrowed the model from her works. Genius itself, about which such vaunting is made, genius itself, that creative faculty, which our wits fondly imagine they brought into the world with them, and have carried to perfection in learned circles, or by the assistance of books, is nothing more than the art of observing. Man cannot forsake the path of nature, even when he is determined to go wrong. We are wise only with her wisdom, and we play the fool only in proportion as we attempt to derange her plans. The engraver, Callot, whose head was so prolific of monsters, composed his numerous demons, merely from the ill assorted members of different animals, the beak of the owl, the jaws of the crocodile, the body of the horse, the wings of the bat, and the fangs and paws of others, which he has united to the human figure to render his contrasts the

more hideous. Our females too, who, sweetly capricious, amuse themselves with embroidering fancy flowers on the various articles of their dress, are reduced to the necessity of borrowing their patterns from the garden. Examine on their gowns and handkerchiefs the sportive productions of their imaginations; you there see the flower of the pink on the foliage of the myrtle, roses on the stalk of the reed, pomegranates in the place of ears of corn. It is nature alone who is regularly and rationally harmonious, and who assort, uniformly, both in animals and plants, parts adapted to the places, the air, the elements, to the uses for which she has destined them. A race of monsters was never seen issuing from the sublimity of her conceptions.

I have frequently heard of living monsters announced for exhibition at our fairs; but I had never the good fortune to see one, though I have taken some pains to effect it. One day a board was displayed at the fair of Saint Ovide: "A cow with three eyes and a sheep with six feet." How, said I to myself, can nature have planted six legs under the body of a sheep, where four were amply sufficient to support it: At the same time I began to recollect that the fly, which is much lighter than the sheep, had six; and I was staggered I own, by the reflection. But having one day observed a fly which had alighted on the paper before me, I found that it frequently employed itself in brushing its head and wings alternately with the two fore and the two hinder feet. I then evidently perceived that it had occasion for six feet, in order to have the support of four, while the other two were applied to the purpose of cleanliness, especially on a perpendicular plane. Having caught, and examined it by the microscope, I discovered that the two middle feet had no brush, but that the other four had. I farther observed, that its body was covered over with small particles of dust which had adhered to it in the atmosphere through which it had been flying, and that the brushes were double, furnished

with fine hairs, between which she emitted and drew back, at pleasure, two claws, similar to those of a cat, but incomparably sharper. These claws enable the fly to lay hold of the most polished surfaces, such as the glass of mirrors, along which you see them march upwards and downwards without sliding. I was eager then to see in what manner nature had attached two new legs to the body of a sheep, and how she had formed, in order to put them in motion, new nerves, new veins, and new muscles, with their insertions. The third eye of the cow perplexed me still more. Accordingly I had nothing to do, but, like other simpletons, to part with my money, and satisfy my curiosity. I saw the people coming out in crowds from the booth, delighted and astonished with what they had beheld. At last, I too, had the happiness of contemplating this wonder of wonders. The two superfluous legs of the sheep were merely two shrivelled pieces of skin, cut out like thongs, and hanging down from the breast, but without touching the ground, and incapable of being of any use whatever to the poor animal; and the pretended third eye of the cow, was a kind of oval wound, in the middle of the forehead, without orbit, without apple, without a lid, and without any membrane that should represent a single organized part of an eye. I withdrew without examining whether these accidents were natural or artificial, for, in truth, it was not worth the trouble.

The monsters which are preserved in crystal globes filled with spirit of wine, such as pigs, with the proboscis of an elephant, children double bodied, or with two heads, which are exhibited in cabinets, with a philosophic mysteriousness, prove not so much the labour or process of nature as the interruption of it. No one of these beings could possibly have attained a complete developement; and so far from demonstrating, that the intelligence which produced them had fallen into an error, they attest, on the contrary, the immu-

tability of supreme wisdom, which has rejected them from its plan by refusing them life.

There is an instance of benignity in the conduct of nature towards man, which is entitled to the highest admiration, which is this: while she prevents him, on the one hand, from infringing upon the regularity of her laws to gratify his caprice; she frequently permits him, on the other, to derange the course of them to relieve his necessities. For example, she connives at the production of the mule, from the copulation of the ass and the mare, because that animal is so serviceable in countries that are mountainous; but forbids the reproduction to proceed, in order to preserve the primitive species, which is of more general utility.

It is easy to discern, in the majority of her works, these maternal condescensions, and, if I may dare call them so, regal provisions and cares. They manifest themselves particularly in the productions of the garden. We find them in those of our flowers, which have a profusion of *corollæ*, as in the double rose, which is not to be reproduced by seeds, and which, for this reason, certain botanists have dared to brand with the name of monster, though universally esteemed, by persons of taste and sensibility, as the finest of flowers. Naturalists pretend that it deviated from the laws of nature, because it scorned to conform itself to their systems: as if the first law which governs the world, had not for its object the happiness of man! But if roses, and other flowers, which have an abundance of *corollæ*, are monsters, fruits which have a superabundance of pulpy flesh, and sugary pastes, of no use towards the expansion of their seeds, such as apples, pears, melons, and fruits which have no seeds at all, as the pine apple, the banana, the bread-fruit, must, in like manner, be monsters. The roots too, which become so plump in our kitchen gardens, and which are converted into large balls, into succulent glands, into farinaceous bulbs, and of no effect toward the expansion of their

stems, must fall under the same censure. Nature feeds the human race, in part, with this vegetable superabundance only, and bestows it but as the reward of industry. However fertile the soil may be, the vegetables of the same species with those which are produced in the garden, degenerate in the uncultivated plain, grow wild, and spend themselves in foliage and branches. Is it not then an instance of wonderful complaisance, on the part of nature, to transform, under the hand of man, into pleasant and wholesome aliment, the same juices which would be converted, in the forest, into lofty stems and tough roots? Were this condescension withheld, in vain would man say to the sap of the trees, you shall flow into the fruit, and you shall proceed no further. To no purpose would he, in the most fertile region, prune, dress, decapitate; the almond tree would refuse to cover its nut with a fleshy and melting pulp, like that of the peach. Nature, from time to time, makes man a present of varieties, both useful and agreeable, which she extracts from the same genus. All our fruit trees come originally from the forest, while no one there re-perpetuates itself in its species. The pear, called St. Germain, was found in the forest of that name, with its well-known flavour. Nature culled it, like the other fruits of our orchards, from the table of animals to serve it up on that of man; and, that it might be impossible for us to doubt respecting her bounty and its origin, it is her sovereign will that the seeds should re-produce wild fruit only. Ah! were she to suspend her particular laws of beneficence in the gardens and orchards of our infidels, in order to establish in them her pretended general laws, what would be their astonishment to find nothing re-produced, but some miserable wild carrots, pitiful dog-roses, harsh pears, and unsavoury fruits, of every sort, such as she produces on the mountains, for the coarse palate of the wild boar? They would, in truth, find stems of trees, lofty and vigorous;

their orchards would be doubled in size, and their crops reduced by one half.

The same metamorphosis would take place in the animals of their farm-yards. The hen, which lays eggs much too large in proportion to her size, and that for nine months together, contrary to all the laws of incubation among the feathered race, would then fall back into the general order, and would produce, at farthest, twenty eggs only, in the course of a year. The hog would in like manner lose his superfluous fat. The cow, which yields in the rich pastures of Normandy, as much as twenty-four quarts of milk a day, would yield no more than a bare sufficiency to suckle her calf.

To this it is replied, that this profusion of eggs, of fat and of cream, from our domestic animals, is the effect of the food which we so lavishly bestow upon them. But neither does the mare give as much milk as the cow, nor the duck lay as many eggs as the hen, nor the ass clothe himself with fat like the hog, though these animals all feed as plentifully the one as the other. Beside, the mare, the she-goat, the ewe, the she-ass, have only two teats, whereas the cow has four. The cow in this respect deviates, in a very remarkable manner, from the general laws of nature, who has proportioned, in every animal species, the number of teats in the mother, to the number of the young. The cow, however, has four dugs, though she produces but one calf, in general, and very rarely two; and the reason is, because the two supernumeraries were destined to be nurses to the human race. The sow, on the contrary, has only twelve teats, though she is intended to bring up, sometimes, a litter of more than fifteen young ones. Here, the proportion would seem defective. But if the first has more teats than are requisite to the number of her family, and the second too few for her's, it is because the one is ordained to furnish man with the surplus of her milk, and

the other with that of her brood. In all countries, pork is the poor man's meat, unless religion, as in Turkey, or political considerations, as in the islands of the South Sea, deprive him of the benefit of this gift of nature. I shall observe, with Pliny, that of all flesh, it is the most savory. There may be distinguished in it, says he, fifty different tastes. It is employed in the kitchens of the rich, to give flavour to every species of aliment. In every country, I repeat the maxim, that which is most common is always the best.

Is it not strange, that, when so many plants and animals exhibit proportions so beautiful, regulations so admirably adapted to our necessities, and proofs so evident of a divine benevolence, we should employ ourselves in collecting shapeless abortions, pigs with a long proboscis, as if our yards teemed with young elephants, and should ceremoniously arrange them in our cabinets, designed to exhibit a display of nature? Those who preserve them as invaluable curiosities, and deduce from them consequences and doubts respecting the intelligence of their author, do they not discover as much want of discernment, want of taste, or want of honesty, as would the man who should go into the workshop of a founder, and pick up the figures which had been accidentally mutilated, the bubblings over of the melting pot, and the mere metallic moulds, which might lie scattered about, and triumphantly display them, as a proof of the ignorance of the artist? The ancients burnt monsters, the moderns preserve them. They resemble those ungracious children, who watch the conduct of their mother, in the hope of surprising her in a fault, in order thereby to justify their own deviations from rectitude. Oh! if the earth were indeed abandoned to disorder, and, after an infinity of combinations, there should at last appear, amidst the monsters which covered it, a single body well proportioned, and adapted to the necessities of mankind, what a source of

satisfaction would it be to creatures, at once sensible and unhappy, to catch but a glimmering of an intelligence that should take an interest in their destiny?

STUDY VII.

ANSWER TO THE OBJECTIONS AGAINST PROVIDENCE
FOUNDED ON THE CALAMITIES OF THE HUMAN
RACE.

THE arguments which are drawn from the varieties of the human race, and from the manifold evils, at once accumulated on its head by nature, by governments, and by religions, would demonstrate, that men have neither the same origin, nor any natural superiority above the beasts; that their virtues are destitute of all hope of reward, and that no providence watches over their necessities, to supply them.

We shall enquire, one after another, into these evils, beginning with such as are imputed to nature, the necessity and utility of which we shall endeavour to evince, and shall afterwards shew, that political evils are to be ascribed entirely to deviations from the laws of nature, and constitute, themselves, a proof of the existence of a providence.

In discussing this interesting subject, we shall first reply to the objections founded on the varieties of the human species. We do not deny, that there are men of a black complexion, and of a white; of the colour of copper, and the colour of ashes; some with an abundance of beard,

and others with little, if any : but these pretended characters are accidents merely, as we have already shewn. Horses white, bay, or black, with frizzled hair, as those of Tartary, or sleek hair, as those of Naples, are, unquestionably, animals of the same species. As to the *Albinos*, or white Negros, they are a species of Lepers ; and no more constitute a particular race of Negros, than persons with us, who have been marked by the small-pox, form a race of spotted Europeans. Though it does not belong to my plan to enumerate here all the natural arrangements and conveniences, which may be opposed to all the accusations of our wretched systems of physics, since I have reserved elsewhere some studies, which, as far as my poor abilities will permit, I intend to devote expressly to this object ; I shall, however, observe by the way, that the black colour of the inhabitants of the tropical countries is a blessing of providence. White reflects the rays of the sun, and black absorbs them. The first, accordingly, redoubles his heat, and the second weakens it. Experience demonstrates this, in a thousand different ways. Nature has employed, among other means, the opposite effect of these colours, for the purpose of increasing, or diminishing, on the earth, the heat of the orb of day. The farther you advance toward the south, the blacker are men and animals ; and the farther you proceed to the north, the whiter is the colour both of the one and the other. Even when the sun merely withdraws for a while from the northern regions, many animals which, in summer, were in those regions of different colours, begin to whiten, as squirrels, wolves, hares ; while animals of the southern regions, to which he is then approaching, clothe themselves with deeper and more absorbent tints. Such, for instance, in the feathered race, are the widow, and the cardinal, which exhibit, when the sun approaches toward the line, a much more vivid colouring than when he is retiring from it.

It is, therefore, by adaptations of climate, that nature has made black the inhabitants of the torrid, and whitened those of the frigid zones. She has given, also, to the Negroes who inhabit Africa, which, chiefly because of that broad belt of sand which crosses it, and of which we have indicated the utility, is the hottest part of the globe, another preservative against the heat. She has covered the head of those unreflecting and unindustrious tribes, with a fleece more curly than a tissue of wool, which effectually shelters it from the burning ardour of the sun; and so perfectly sensible are they of its accommodation in this respect, that they never employ a substitute for it, and there is no description of mankind among whom artificial coverings, as bonnets, turbans, hats, &c. are more rare than among these Negroes. If they use such as are foreign to them, it is merely as objects of vanity and luxury; nor do I know of one that is peculiar to their nation. The inhabitants of the peninsula of India are as black as they; but their turbans give to the hair, which would otherwise, perhaps, also be frizzled, the facility of growing and expanding. The American tribes, which inhabit under the line, it must be admitted are not black; they are simply copper-coloured. This weakening of the swarthy tint, I ascribe to several causes peculiar to their country. The first is the practice, universal among them, of rubbing themselves over with a paste called roucou, which preserves the surface of their skin from the too vehement impression of the sun. Secondly, they inhabit a country clothed with forests, and crossed by the greatest river in the world, which covers it with vapours. Thirdly, their territory rises insensibly from the shores of Brazil, to the very mountains of Peru; which, giving it a greater elevation in the atmosphere, procures for it, likewise, a greater degree of coolness. And lastly, the east winds, which blow there, night and day, are always contributing to that coolness. In reality, the colour of southern

nations is so much the effect of the climate, that the descendants of Europeans, settled there, assume, after the lapse of a few generations, the same tint. This is strikingly the case in India, in the posterity of the Moguls, tribes derived from the extremity of Asia, whose very name signifies whites, and who are now as black as the nations which they have conquered.

Difference of stature, which is another argument with our objectors, no more characterizes one species from another, be the genus what it may, than does difference of colour. A dwarf and a large apple tree, proceed from the same grafts. Nature, however, in the human species, and in that alone, has avoided this difference, and has rendered the stature invariable, because variety of magnitude would have destroyed, in the physical order, the proportions of man with the universality of her productions, and would have involved, beside, in the moral order, consequences still more dangerous, by subjecting, beyond recovery, the smaller species of mankind to the larger.

There are no races either of dwarfs or giants. Those which are exhibited at our fairs, are little men stunted by accident, or tall overgrown beings, without proportion and without vigour. They are found not to re-produce themselves, either in miniature, or magnitude, whatever pains may have been taken by certain princes, and particularly by the late king of Prussia, Frederick II. to procure a distinct propagation. These instances then out of the question, where are the varieties of proportion of the human species, issuing from the hand of nature, to be seen, sufficient to authorise the distinctive appellation of dwarfs, and giants? Is there, between any two of them, so great a difference, as between a little Sardinian poney, and a huge Brabant horse; or as between a small spaniel, and one of the large Danish dogs, which run before our coaches? All nations have been, from the beginning, and are still, with very

little variation, and very few exceptions, of the same stature. I have seen Egyptian mummies, and the bodies of the Guanches of the Canary islands wrapped up in their skins; I have seen, in Malta, taken from a tomb hewn out of the solid rock, the skeleton of a Carthaginian, all the bones of which were violet-coloured, and which had, perhaps, reposed there from the days of queen Dido: and these bodies were all of the common size. Enlightened and sober-minded travellers have reduced to a stature, hardly exceeding our own, the pretended gigantic form of the Patagonians. I am aware that I am chargeable with tautology, having detailed in another part of my work the same reasons; but it is impossible to repeat them too frequently, because they strike at the root, and overturn for ever, the pretended influences of climate, which are become the principles of our physics, and, what is more to be lamented, of our morality also.

There were formerly, we are told, real giants. The thing is possible; but, if a truth, it is become inconceivable to us, like other pretended truths, of which nature no longer furnishes any testimony. If Polyphemuses, lofty as a tower, had formerly existence, at every step they took in walking they must, in most soils, have sunk into the ground. How could their long and clumsy fingers have milked the diminutive she-goats, reaped the corn, mowed down the grass, or gathered even the fruits of the orchard? The greatest part of our aliments would escape their eyes as well as their hands. On the contrary, had there been generations of pigmies, how could they have levelled the forests, to make way for the cultivation of the earth? They would have lost themselves among the rushes. Every brook would have been to them a river, and every pebble a rock. The birds of prey would have carried them off in their talons, unless indeed they made war upon their eggs, as Homer represents his pigmy race engaged in war with the eggs of

cranes. On either of these suppositions, all the relations of natural order are burst asunder, and social order, by such discords, is necessarily involved in the destruction. Suppose a nation of giants to exist, capable of our industry, and endowed with our ferocious passions: place at the head of it a Tamerlane; and what would become of our fortifications and our armies, before their artillery and their bayonets?

In proportion as nature has affected variety in other species of animals of the same genus, though inhabiting the same regions, and subsisting on the same aliments, to the same degree has she studied uniformity in the production of the human species, notwithstanding the difference of climate and of food. In certain individuals of mankind, the accidental prolongation of the coccyx has been mistaken for a natural character, and a new species of men, with tails, has absurdly been inferred from it. The passions of beasts may, indeed, degrade man to their level, but never has his noble form been dishonoured by the tail, the forked feet, and the horns of the brute. In vain do we attempt to approximate him to the class of mere animals, by insensible transitions: were there a race of human beings, with animal forms, or animals endowed with human reason, they could not fail to have been known to us. We should have them in Europe, especially in times like the present, when the whole globe is explored, in every quarter, by so many enlightened travellers; and when, I do not say princes, but puppet-players and shew-men import alive into our fairs, the zebra so wild, the elephant so lumpish, tigers, lions, white bears, and even crocodiles; which have all been publicly exhibited in London. In vain have analogies been supposed between the female of the human race and that of the orang-outang, from the situation and form of the bosom, from the periodical sexual purgations, from the attitude, and even from a sort of modesty said to prevail in

both. Though the female orang-outang may pass her life in a sort of seclusion, in the woods, Allegrain, as we have said before, certainly could never have modelled from her his statue of Diana, which is shewn at Lucienne. Between the reason of man and that of the beasts, there is a difference still more striking than between their forms; and strangely must that mind have been perverted, who could advance, as a celebrated author has done, that the distance between the understanding of Newton and that of a clown is greater than between the understanding of a clown and the instinct of an animal. The dullest of mankind can learn the use of fire, and the practice of agriculture, of which the most intelligent animal is absolutely incapable; this we have observed already, but we have not observed, that these two discoveries, the simple use of fire, and the practice of agriculture, are far preferable to all the discoveries of Newton, valuable as they may be.

Agriculture is the art of nature, and fire her primary agent; and we are assured, from experience, that, by means of this art and this element, men have acquired a plenitude of intelligence, of which all their other combinations, so to speak, are mere consequences. Our sciences and arts are derived, for the greatest part, from these two sources, but they constitute no more actual difference between the understandings of men, than do the dress and furniture of Europeans and those of savages. They are perfectly adapted to the necessities both of the one and of the other, and the intellect, therefore, which contrived them must be nearly the same. The importance which we assign to our talents, proceeds, not from their utility, but from our pride. How well calculated would it be to humble us, did we consider, that the animals, which have no skill in agriculture, and know not the use of fire, attain to almost all the objects of our arts and sciences, and even surpass them? I am not referring to those merely which build, spin, manufacture

paper, cloth, hives, and practise a multitude of other trades, of which we have no knowledge; but also to the torpedo, which defended himself from his enemies, by means of the electric shock, before academics thought of making experiments in electricity; and the limpet, which understood the power of the pressure of the air, and attached itself to the rocks, by forming the vacuum with its pyramidal shell, centuries ere the air-pump was invented. The quails, which annually take their departure from Europe, on their way to Africa, have so perfect a knowledge of the autumnal equinox, that the day of their arrival in Malta, where they rest for twenty-four hours, is marked on the almanacks of the island, about the twenty-second of September, and varies every year as the equinox varies. The swan and wild duck have an accurate knowledge of the latitude where they ought to stop, when, every year, they return, in spring, to the extremities of the north, and can find out, without the help of a compass or octant, the spot where, the year before, they made their nests. The frigate, which flies from east to west, between the tropics, over vast oceans, interrupted by no land, and which finds at night, after a journey of many hundred leagues, the rock, hardly emerging out of the water, which he left in the morning, possesses means of ascertaining his longitude, hitherto unknown to our most ingenious astronomers.

Man owes his intelligence, it is said, to his hands: and the monkey, the declared enemy of all industry, has hands also. The sluggard, or sloth, also has hands, and these hands ought to have suggested to him the propriety of fortifying himself, of digging, at least, a retreat in the earth, for himself and his posterity, exposed as they are to a thousand accidents, by the slowness of their progression. There are animals, likewise, in abundance, furnished with tools much more ingenious than hands, and which are not, for

all that, a whit the more intelligent. The gnat has a proboscis, which is at once an awl, proper for piercing the flesh of animals, and a pump by which to suck out their blood. This proboscis contains, beside, a long saw, with which he carves the small blood-vessels at the bottom of the wound which he has opened. He has wings also, to transport him wherever he pleases; a corslet of eyes studded round his diminutive head, that he may see all the objects around him; talons so sharp, that he can walk on polished glass in a perpendicular direction; feet supplied with brushes for cleaning himself; a plume of feathers on his forehead; and an instrument answering the purpose of a trumpet, to proclaim his triumphs. He inhabits the air, the earth, and the water, where he is born in the form of a worm, and where, before he expires, the eggs which are to produce a future generation are deposited. With all these advantages, he frequently falls a prey to insects smaller than himself, and of a much inferior organization. The ant, which merely creeps, and is furnished with no weapons but pincers, is formidable, not to the gnat only, but to animals of a much larger size, and even to quadrupeds. She knows what the united force of a multitude is capable of effecting; she forms republics; she lays up stores of provisions; she builds subterraneous towns; she forms her attacks in regular order of battle; she advances in columns, and sometimes constrains man himself to surrender to her, in hot countries. But, so far is the intelligence of any animal from depending on its limbs, that the perfection of those limbs, on the contrary, is frequently in the inverse ratio of its sagacity, and appears to be a kind of compensation in nature to make up for a defect. To ascribe the intelligence of man to his hands, is to infer the cause from the means, and the talent from the tool with which it works. As well might we say, that Le Sueur owes the na-

tural and enchanting graces of his pictures to a brush made of the hair of a sable, and Virgil all the harmony of his verses to a feather of the swan of Mantua.

To maintain, that the reason of human beings depends on climate, because there are shades of variety in their manners and customs, is still more extravagant. The Turks cover their heads with turbans, and we cover ours with hats ; they wear long flowing robes, and we dress in coats, with skirts that are short. In Portugal, says Montagne, they drink the sediment of wines, and we throw it away. Other examples, which I could cite, are of similar importance. To this I answer, that, if we were in the country of these people, we should act as they do ; and that, if they were in ours, they would act as we do. Turbans and robes are adapted to hot countries, where the head and body require to be cooled, by inclosing in the covering of both a greater mass of air. It was from this necessity that the turbans of the Turks, the Persians and Indians, the mitres of the Arabians, the sugar-loaf bonnets of the Chinese and Siamese, and that wide and flowing vest, worn in general by the nations of the south, actually originated. From a contrary necessity, the nations of the north, the Polanders, the Russians, the Tartars, wear furred caps and close apparel. We too, in our climates, must have three aqueducts upon our head, because of the rain, and shortened garments, because of the dirt. The Portuguese drink the sediment of wine ; and so would the French, if they had the wines of Portugal ; for in sweet wines, as those of hot countries, the most sugary particles are at the bottom of the cask ; whereas in ours, which are sprightly, nothing is at the bottom but mere dregs, the best is uppermost. I have seen in Poland, where they drink great quantities of the wines of Hungary, the bottom of the bottle given in compliment to the guests, from its being of a better quality. Thus the very varieties of national customs, instead of exhibiting human reason

as anomolous, proves, on the contrary, its universal consistency.

Climate has as little to do in changing the morality of men, which is reason carried to perfection. I admit, however, that extreme heat and cold produce an effect on the passions; for I have remarked, that the hottest days of summer, and the coldest of winter, were actually the seasons of the year when most crimes have been committed. The dog-days, say the vulgar, is a season of calamity. The same might be said of the month of January. It must have been, I conceive, in conformity to these ideas, that the ancient legislators established, for that critical period, festivals calculated to dissipate the melancholy of the mind, as the feast of Saturn among the Romans, and the feast of kings among the Gauls. In each nation, the festival was adapted to the public taste; among the Romans, it presented the images of a republic; among our ancestors, those of monarchy. I have at the same time remarked, that those seasons, fertile in crimes, are the seasons also of the most splendid actions. This effervescence of season acts on our senses like the effervescence of wine. It produces, as in us, an extraordinary impulse, but it is to good and evil indifferently. Nature, beside, has implanted in our soul two powers, which, at all times, balance each other in just proportion. When the physical sense, love, debases us, the moral sentiment, ambition, lifts us up again. The equilibrium necessary to the empire of virtue, still subsists, and is never incapable of action, except in persons with whom it has been destroyed by the habits of society, or, which is still more frequently the case, by those of education. Then, the predominant passion, having no longer a counterpoise, assumes the command of all our faculties: but this is the fault of society, upon whom also falls the punishment of it, and not the fault of nature.

Meanwhile, it must be observed, that these seasons exert their influence on the passions of man, by acting only on his moral, and not on his physical sense. Though this reflection has something of the air of paradox, I shall support it by a very remarkable observation. If the heat of climate could act on the human body, it must certainly do so when it is in the womb of its mother: for it then acts on the body of all other animals, whose expansion it accelerates. Father Du Tertre, in his excellent history of the Antilles, says, that in those islands, the period of gestation, of all European animals, is shorter than in temperate climates; and that the eggs of a hen are not longer in hatching, than the seeds of the orange in bursting their shell, which is twenty-three days. Pliny had observed in Italy, that this hatching required in summer nineteen days, and twenty-five in winter. In every country the temperature of climate hastens or retards the expansion of all plants and the gestation of all animals, the human race excepted. "In the Antilles," says Du Tertre, "the white women and the negroes go alike nine months with child, as in France." I have made the same remark in all the countries through which I have travelled, from the Isle of France, which is under the tropic of Capricorn, to the extremity of Russian Finland. This observation is of considerable importance, and should not be forgotten. It demonstrates that the human body is not subjected, in this respect, to the same laws with other animals. It manifests a moral intention in nature, to preserve an equilibrium in the population of nations, which, had the pregnancy of the woman been of shorter duration in hot countries than in cold, would obviously have been deranged. This intention is farther manifest in the admirable proportion which nature maintains in the production of the two sexes, so nearly equal in number; and even in the difference in this respect, of one country from another: for this difference

is compensated for upon the general plan, in such a manner, that, if the balance be rather in favour of women to the south, to the north it is in favour of men; as if nature meant to attract and unite nations, the most remote from each other, by intermarriages.

Climate has an influence upon morality, but by no means determines it; and though this supposed determination is considered, in many modern books, as the fundamental basis of the legislation of nations, there is no philosophical maxim more completely refuted by historical testimony. "It is in lofty mountains," say these writers, "that liberty has chosen her asylum; it was from the north issued forth the haughty conquerors of the world. In the southern plains of Asia, on the contrary, reign despotism, slavery, and all the political and moral vices, consequent upon the loss of freedom." Must we then regulate by our barometers and thermometers, the virtue and happiness of nations? There is no need to go out of Europe, in order to find a multitude of monarchial mountains, as Savoy, for instance, a part of the Alps, and of the Apennines, and the whole of the Pyrennees. On the other hand, many republics will be found in its plains, as the republic of Holland, of Venice, of Poland, and even of England. Beside, each of those territories has by turns, made trial of different forms of government. Neither coldness of climate, nor ruggedness of soil, inspire men with the energy of liberty, and still less with the unjust ambition of encroaching on the independence of others. The peasants of Russia, of Poland, and of the cold mountains of Bohemia, have been slaves for ages; whereas the Angrias, and the Marattahs, in the south of India, are freemen and tyrants. There are several republics on the northern coast of Africa, where it is excessively hot. The Turks, who have seized upon the finest provinces of Europe, issued from the mild climate of Asia. The timidity of the

Siamese, and of Asiatics in general, has been mentioned as proofs; but this timidity is to be imputed to the multitude of their tyrants, rather than to the heat of their countries. The Macassars, who inhabit the Island of Celebes, situated almost under the line, are possessed of so intrepid a courage, that a small number of them, as the gallant Count Forbin relates, armed with poignards only, put to flight the whole force under his command, at Bancoek, consisting of Siamese and French, though the former were extremely numerous, and the others armed with muskets and bayonets.

If, from courage, we pass on to love, we shall find that climate has no more a determining power over man, in the one case than in the other. Upon the subject of the excesses of love, and in order to ascertain which has the superiority, in this respect, the nations of the south, or those of the north, I refer to the testimonies of travellers. This passion is in all countries a torrid zone to the heart of man. The appropriations of love to the nations of the south, and of courage, to the nations of the north, imagined by our philosophers, as effects of climate, it is curious to remark, are applicable only to foreign nations: for, in our own heroes, to whom they wish to pay their court, these two qualities are sure to be united, as effects of the same temperament. A Frenchman, great in feats of love is, according to them, likewise great in feats of war; but this does not hold as to other nations. An Asiatic, with his seraglio, is an effeminate coward, and a Russian, or any other soldier of the north, whose monarch gives pensions, a second Mars. But all these distinctions of temperament, founded on climate, and so injurious to mankind, before the following question vanish into air: Are the turtle-doves of Russia less amorous than those of Asia; or the tigers of Asia less ferocious than the white bears of Nova Zembla?

Without perambulating the earth, to seek among men of different nations for objects of comparison and contrast, we

shall find greater diversity in manners, in opinions, in habiliments, and even in physiognomy, between an opera actor and a capuchin friar of our own country, than is between a Swede and a Chinese. What contrast can be more striking than the garrulous, flattering, deceitful Greek, so fondly attached to life, and the silent, stately, honest Turk, ever devoted to death? Yet these men, so opposite in character, are born in the same cities, breathe the same air, live on the same food. But their extraction, we shall be told, is not the same: for pride, among us, ascribes a mighty influence to the effect of blood. But those Janissaries, so formidable to the cowardly Greeks, are frequently their own children, whom they have been obliged to give in tribute, and who have passed, by a regular routine, into this first corps of the Ottoman soldiery. The courtesans of India too, so voluptuous, and its penitents so austere, are they not of the same nation, and, in many cases, of the same family? Where, let me ask, shall I find the instance, in which an inclination either to vice or to virtue, was ever known to be communicated with the blood? Pompey, so noted for his generosity, was the son of Strabo, held in infamy by the Roman people for his avarice. The cruel Domitian was brother to the amiable Titus. Caligula, and Agrippina the mother of Nero, were, indeed, brother and sister; but they were the children of Germanicus, the darling hope of Rome. The barbarous Commodus was son to the divine Marcus Aurelius. What a difference is frequently observable in the same man, in his youth and his mature age; in Nero, saluted as the father of his country, when he ascended the throne, and Nero execrated before his death, as its avowed enemy; in Titus, stigmatized with the name of a second Nero when young, and Titus at his decease, honoured with the tears of the senate, of the Roman people, and of strangers, and transmitted unanimously to posterity as the delight of mankind? It is not climate, then, which regulates the morality of man, it is opinion, it is education;

and so great is their power, that they triumph not only over latitudes, but even over temperament. Cesar, so ambitious and dissolute; and Cato, so temperate and virtuous, were both of an infirm constitution. Place, climate, nation, family, temperament, no one of these, and in no part of the world, determines either to vice or to virtue. Men are every where free to choose.

Before we take into consideration the evils which men bring upon themselves, let us attend to those which are inflicted by the hand of nature. There are beasts of prey, it is said. Certainly, and these beasts of prey are absolutely necessary. But for them the earth would be infested with cadaverous substances. There perishes, annually, of a natural death, the twentieth part, at least, of quadrupeds, the tenth of fowls, and an infinite number of insects, of which, indeed, most species live only a year. Nay, there are insects whose life is contracted to a few hours, such as the ephemera. As the rains convey all these spoils of the land to the rivers, and thence to the seas, it is, accordingly, on their shores, that nature has collected the animals which are destined to consume them. Most of the ferocious animals descend thither by night, from the mountains, to hunt for their prey; there are even classes created expressly for such situations; as the amphibious race, for example, the white bear, the otter, the crocodile. It is in hot countries, in particular, where the effects of corruption are most rapid and most dangerous, that nature has multiplied carnivorous animals. Tribes of lions, tigers, leopards, panthers, civet cats, lynxes, jackalls, hyenas, condors, resort thither, to reinforce those of wolves, foxes, martens, otters, vultures, crows, and others. Legions of voracious crabs are nestled in their sands; the alligators and the crocodiles lie in ambush among their reeds; shell fish of innumerable species, armed with utensils for sucking, piercing, filing, and bruising, give a rough aspect to the rocks, and pave the

borders of their seas ; clouds of marine fowls hover, with a loud noise, over their shallows, or sail round them, at the discretion of the waves, in quest of food ; the lamprey, the becune, the carang, and the whole species of cartilaginous fishes, which live only on flesh, such as the hygian, the long shark, the broad thornback, the slipper, the polypus, armed with air holes, and all the varieties of sea dogs, swim there in crowds, constantly employed in devouring the wreck of bodies thrown upon the shore. Nature calls in also the insect legions to hasten their consumption. The wasps furnished with scissars, cut asunder the muscles ; the flies pump out the fluids ; the sea worms dispatch the bones. These last, on the southern coasts, and especially at the mouths of rivers, exist in such abundance, and are armed with augers so formidable, that they are capable of devouring a ship of war in less time than it cost to build it ; and accordingly the maritime powers have lately been reduced to the necessity of sheathing with copper the bottoms of their squadrons, as a security against their attacks. The wrecks of all these bodies, after having served for food to the innumerable tribes of other fishes, of which some are provided with beaks formed like a spoon, and others like a pipe, for picking up the very crumbs of this vast table, being reduced at length, through such a series of digestions, into phlegms, oils, bitumens, and united to the pulps of vegetables, which descend from all quarters into the ocean, would reproduce in its waters a new chaos of putrefaction, did not the currents convey their dissolution to volcanoes, whose fires finish the process of decomposition, and give them back again to the elements. It is for this reason, as we observed before, that volcanoes are frequent only in hot countries ; that they are situated always in the vicinity either of the sea, or of large lakes, at the extremity of their currents ; and that they owe entirely to the purification of the waters, the sulphurs and bitumens, which administer to their furnaces a constant fuel,

Animals of prey are, to man, objects of very little terror. Because, in the first place, the majority of them roam only in the night. Because, also, they have prominent characters, which announce their approach even before it is possible to perceive them. Some savour of musk, as the marten, the civet cat, the crocodile; others have a shrill and piercing cry, which may be heard in the stillness of night, at a considerable distance, as wolves and jackals; others are distinguished by parti-coloured spots, or streaks, observable on the yellow ground of their skin a great way off, as the dusky stripes of the tiger, and the dark spots of the leopard; and all have eyes which sparkle in the dark, and warn us of our danger. Some of these common signatures nature has bestowed even on carnivorous and blood-sucking insects; such are wasps, whose ground colour is yellow, surrounded with rings of black like the tiger, and gnats, spotted with white upon a dark ground, and they announce their approach by a loud buzzing. Even those which attack the human body are furnished with remarkable indications. They either smell strongly, as the bug; or else exhibit oppositions of colour to the places on which they fix, as white insects on the hair, or the black flea contrasted with the fairness of the skin.

Many writers exclaim with as much vehemence upon the cruelty of ferocious animals, as if our cities were liable to be invaded by swarms of wolves; or bands of lions, from Africa, were, from time to time, making incursions into our European colonies: whereas they shun the habitations of man, and, as I have just said, leave their haunts only in the night. These circumstances, naturalists, hunters, and travellers are unanimous in attesting. When I was at the Cape of Good Hope, M. de Tolback, who was then governor, informed me, that lions were formerly very common in the adjacent country; but that since the Dutch had formed a settlement there, you must travel fifty or sixty leagues into the interior

before you can see one. And what, after all, is their ferocity to us? Even supposing ourselves not provided with arms, which they are incapable of resisting, and not endowed with a sagacity more than a match for their cunning, nature has given us dogs able to combat, and even to subdue them; and she has most admirably adapted their species to those of animals the most formidable. In the countries where lions are indigenous, there is likewise a breed of dogs indigenous, capable of engaging them in single combat. I shall relate here what Pliny says of a dog of this species, which was presented to Alexander by a king of Albania.* “ Alexander first opposed a lion to this dog, “ which the dog presently tore in pieces. After that he “ ordered an elephant to be let loose, which afforded the “ highest diversion: for the dog, bristling himself up, “ began, at first, to wheel about, and snarl at the elephant; “ he then advanced to the attack, springing on this side and “ on that, with all imaginable circumspection, now leaping “ to assault him in front, now couching to the right, now “ annoying him to the left; which caused the elephant to “ turn and wind so frequently, that at last tired out, he fell “ down with a force which made the ground tremble; on “ which the dog sprung upon him, and killed him.” This dog, I conceive, could hardly have descended from the same race as our lap-dogs.

The animals formidable to man, are more to be feared from their smallness than their magnitude; and, at the same time, there is not one but what may be rendered subservient to his benefit. Serpents, centipeds, scorpions, toads, inhabit chiefly humid and unwholesome places, from which they keep us at a distance, rather by their hideous figures, than by their poisons. Serpents, really dangerous, give signals of their approach; such are the rattles of the

* Pliny's Natural History, book viii. chap. 40.

species of snake bearing the name, from that circumstance, of rattle-snake. Few persons perish by their sting, and those few, perhaps, only from their own imprudence. Beside, our pigs and poultry eat them, without suffering the slightest inconvenience. Ducks, in particular, devour them with avidity, as they do also most plants that are poisonous. The ducks of the kingdom of Pontus acquired so much virtue, by aliments of this sort, common in that country, that Mithridates employed their blood in his famous counter-poisons.

There are insects, I grant, noxious in their nature, which prey upon our fruits, our corn, and even our persons. But if snails, may-bugs, caterpillars, and locusts ravage our plains, it is because we destroy the birds of our groves; which live upon them; or because, when importing the trees of foreign countries into our own, as the great chesnut of India, the ebony, and others, we import, at the same time, the eggs of the insects which they nourish, while the birds of the same climate, which destroy those insects, are left behind. Every country has birds peculiar to itself, for the preservation of its plants. I have seen, at the Cape of Good Hope, a species, called the gardener's bird, incessantly employed in destroying the worms and caterpillars, which, as he caught them, he stuck on the thorny prickles of the bushes. I have likewise seen in the Isle of France, a species of starling, called martin, which comes from India, and which lives entirely on locusts and other insects that infest the cattle. Naturalize these birds in Europe, and no scientific discovery we have ever made would prove so beneficial to man. But the birds of our own groves would perhaps be sufficient of themselves to clear our plains of these inconveniencies, were the bird-catchers forbidden to entrap them, as they do, by whole covies, in their nets, not for the purpose of immuring them in cages, but to make food of them. A fancy, some years ago, prevailed in Prussia,

of proscribing the race of sparrows, as inimical to agriculture. Every peasant was subjected to an annual capitation of twelve heads of this species of bird, which were employed in the manufacture of saltpetre; for, in that country, nothing is lost. At the end however of the second year, or, at farthest, of the third, it was discovered that the crops were devoured by insects, and it was speedily found advisable to invite the sparrows from neighbouring countries, to re-people the kingdom with them, and remedy the evil. These birds, it is true, when insects fail them, eat some grains of our corn; but insects, be it remembered, and among others, the weevil, consume it by bushels, and even by granaries. Meanwhile, if the whole race of insects could be destroyed, it would not be prudent to attempt it; since there would be destroyed, along with them, most of the feathered tribes of our plains, which, during the season of breeding, have no other food for their young.

As to the animals which devour our corn in the granary, and our woollens in the warehouse, such as rats, mice, mites, and moths, I find, that the former are useful in purifying the earth from human excrement, which, in great measure, constitutes their food. Beside, nature has made man a present of the cat, to keep these troublesome animals from his habitation; and she has endowed her not only with uncommon agility, and with wonderful patience and sagacity, but also with a spirit of domesticity, perfectly adapted to her employment. The cat is attached to the house, and not to its inmates. If the master remove, she returns alone at night to her old habitation. She differs, in this respect, essentially from the dog, who attaches himself solely to the person of his master. The one has the affection of a courtier, the other the fidelity of a friend; the cat adheres to the possession, the dog only to the man. As to the weevil and the moth, which sometimes commit such depredations among our grain and our woollens, there are

writers who have told us, that the common hen is sufficient to clear the granaries of them. This may possibly be true; but we have beside the spider and the swallow, which make war upon them at the season when they first take wing. I shall here, however, consider only their political utility. When we reflect on those prodigious magazines, where monopolizers hoard up the provision and clothing of a whole province, have we not reason to bless the hand that created the insect, which obliges them to bring these necessary commodities to market! Were grain as incorruptible as gold and silver, it would soon become as scarce. See under how many locks and doors these metals are secured. If subsistence were as little susceptible of change as the coin which is the representative of it, the commonalty would, in time, have nothing to eat. They are the mite and the moth which first lay the miser under the necessity of employing a number of hands in removing and sifting his grain, till he is forced, at last, to dispose of it altogether. If the moth did not devour the wardrobes and warehouses of the rich, how many poor wretches would be naked? What is still more wonderful, is, that the articles which minister to luxury are not in the same manner liable to perish, as those which are subservient to the most pressing wants of life. Coffee, silk, and cottons, in countries where they are not indispensable, may be preserved, without any diminution of value, even for ages; but in India, where they constitute the real necessities of life, there are insects which quickly destroy them, and particularly cotton. The insects which attack the human body, equally oblige the rich to employ those who have no riches, to preserve, in the capacity of domestics, cleanliness around them. The Incas of Peru even exacted this tribute of the poor; for in all countries these insects attach themselves to man, though it has been said, that they have not passed the line. Beside, these insects are rather teasing than

injurious, for they draw off the bad humours from the blood. As they immoderately increase only in the season of great heats, they invite us also to have recourse to bathing, which is so wholesome, and yet so neglected among us, because baths, from being expensive, are become an object of luxury. Moreover, nature has placed near us other insects, to destroy them, which are spiders.* I have heard of an old officer, who, being very much incommoded with bugs, at the Hospital of Invalids, permitted the spiders to multiply round his bed, and thereby ridded himself of this nauseous vermin. The remedy, I am aware, will appear to many worse than the disease; but I have no doubt that others, more agreeable, may be found, in perfumes and oily essences; at least, I have remarked, that the odour of various kinds of aromatic plants puts to flight those troublesome and disgusting animals.

As to other calamities of nature's afflicting, man feels their pressure only because he deviates from her laws. If storms sometimes ravage his orchards and his corn-fields, it is because he frequently places them where nature never

* This spider, I conceive, to be of a particular species; for I have no doubt there are as many species of them as there are of insects to be destroyed. They do not all spread nets for their prey; some catch it fairly in the chace: others succeed by lying in ambuscade. I have seen a spider in Malta of a very singular character, and which is to be found in every house of that island. Nature has bestowed on it, in the head and fore part of the body, the resemblance of a fly. When it perceives a fly on the wall, it makes its first approaches in great haste, taking care always to maintain the highest station. When arrived within five or six inches of its object, it advances slowly, presenting to the fly a treacherous resemblance; and when within the distance of two or three inches, makes upon it a sudden spring. This spring made on a perpendicular plane, one would suppose must precipitate it to the ground. No such thing. You find it still on the wall, whether it has made good its blow or missed it; for previously to this effort, it had affixed to the wall a string, by which to regain its situation. Cartesian philosophers, will you dare, after this, to maintain, that animals are mere machines?

intended they should grow. Storms are seldom known to injure any cultivation, except the cultivation of man. Forests and natural meadows never, in the slightest degree, suffer from them. Beside, they have their utility. When accompanied with thunder, they cool and purify the air. When attended with hail, they destroy great quantities of injurious insects; and hails are frequent only at the seasons when such insects are about to increase and multiply, that is in spring and summer. But for the hurricanes of the torrid zone, the ants and locusts would render the islands situated between the tropics totally uninhabitable. The utility, and absolute necessity of volcanoes, whose fires purify the waters of the sea, as those of the thunder purify the air, I have already pointed out. Earthquakes proceed from the same cause. Nature, too, gives previous notice of their effects, and of the places where their focuses are situated. The inhabitants of Lisbon, whose city has been several times shattered by shocks of this kind, well know that it is imprudent to build with stone. To persons who can submit to live in houses of wood, they have nothing formidable. Naples and Portici are perfectly acquainted with the fate of Herculaneum. After all, earthquakes are not universal; they are local only and periodical. Pliny has observed, that the Gauls were not subject to visitations of this kind; and there are many other countries which know nothing of them but by report. They are scarcely any where felt in the neighbourhood of volcanoes, situated near the shores of the sea, or of great lakes, and there only on certain portions of the coast. The epidemical diseases of the human race, and the distempers of animals, are to be imputed to corrupted waters. Physicians, who have investigated their causes, ascribe them sometimes to the corruption of the air, sometimes to the mildew of plants, and sometimes to fogs; but these causes are all simply the effects of corrupted waters, from which arise putrid exha-

lations, that infect the air as well as vegetables, and animals. This may be charged, in almost every instance, to the injudicious labours of man. The most unwholesome regions of the earth, as far as I am acquainted with it, are in Asia, on the banks of the Ganges, from which proceed, every year, such putrid fevers, that in 1771, Bengal lost thereby more than a million of men. They have for their focus the rice plantations, which are artificial morasses, formed along the Ganges, for the culture of that grain. After the crop is reaped, the roots and stalks of the plant left on the ground, rot, and are transformed into infectious puddles, from which pestilential vapours are exhaled. It is with the view of preventing these pernicious consequences, that the growth of this plant has, in many parts of Europe, been expressly prohibited, and especially in Russia, in the environs of Otzchakof, where it was formerly cultivated. In Africa, the air of the island of Madagascar is corrupted, during six months of the year, from the same cause, and will ever present an invincible obstacle to the establishment there of European settlements. All the French colonies, which were planted, have perished one after another; and I, myself, with the rest, must have fallen a victim, had not Divine Providence, by means of which I could have no foresight, prevented my intended voyage to, and residence in, that part of the world. It is from the ancient miry canals of Egypt, that the leprosy and the pestilence are perpetually issuing. In Europe, the old salt marshes of Brouage, which the water of the sea no longer reaches, and in which the rain waters stagnate, because confined by the dykes and ditches of the salt pits, are become constant sources of distemper among the cattle. Similar diseases, putrid and bilious fevers, and the land scurvy, annually issue from the canals of Holland, which putrify in summer to such a degree, that I have seen them, in Amsterdam, covered with dead fishes; and it was not possible to cross certain streets, with-

out stopping your breath with your handkerchief. A kind of current indeed is given to the stagnant waters, by means of windmills, which pump them up, and throw them over the dikes, in places where the canals are lower than the level of the sea; but these machines are by far too few in number. The bad air of Rome, in summer, proceeds from its ancient aqueducts, of which the waters are diffused among the ruins, or have inundated the plains, where they stagnate, because the levels of those plains have been interrupted by the magnificent labours of the ancient Romans. The purple fever, the dysentery, the small pox, so common in our villages, after the heats of summer, and in spring, when the season has been warm and humid, proceed, for the most part, from the puddles of the peasantry, in which leaves and the refuse of plants putrify. Many of our city distempers issue from the dunghills in their neighbourhood, and from the cemeteries about our churches, which penetrate also into the very sanctuary. In my opinion there would not have been a single unwholesome spot on the earth, if the hands of man had no where meddled with it. The malignity of the air of St. Domingo, Martinico, Porto Bello, and several districts of America, are cited as a natural effect of climate. But these places have been inhabited by savages, who, from time immemorial, have busied themselves in diverting the course of large rivers, and choking up small ones. These labours constitute even an essential part of their defence. In the fortification of their villages, they imitate the beavers, by inundating the country around them. Provident nature, however, has placed those animals only in cold latitudes, where, in imitation of herself, they form lakes which soften the air, and she has placed running waters in hot latitudes, because lakes would there speedily change, by evaporation, into putrid marshes. The lakes which she has scooped out in such latitudes, are all situated among mountains, at the sources of rivers, and in a cool atmosphere. I am the more

induced to impute to savages the corruption of the air, so fatal in some of the Antilles, as all the islands which have been found uninhabited were exceedingly wholesome; as the isle of France, for instance, of Bourbon, of St. Helena, and others.

As the corruption of the air is a subject of particular importance to us, I shall venture cursorily to suggest some simple methods of remedying it. The first is to remove the causes of it, by substituting, in place of the stagnant puddles, with which our villages abound, the use of cisterns, of which, when they are judiciously constructed, the waters are so salubrious. In Asia, these cisterns are every where made use of. Care should likewise be taken to prevent the bodies, and other offal, of dead animals, from being thrown into the laystalls of our cities: they ought, on the contrary, to be carried to the rivers, which would thereby be rendered more productive of fish. In the case of cities, not washed by rivers sufficient to carry off such filth, or where the method I am recommending is found otherwise inconvenient, attention should be paid, at least, to placing the laystalls to the north and north-east only of such cities, in order that they may escape, especially during summer, the fetid gusts which pass over them from the south and south-west. A second remedy is to abstain from digging canals. We know the maladies which have resulted from those of Egypt, in the vicinity of Rome, and other places, where no care is taken to keep them in repair. Beside, the benefit derived from canals is very problematical. To see the medals which have been struck in our own country, on occasion of the canal of Briare, one would almost suppose that the strait of Gibraltar was henceforth to become superfluous to the navigation of France. Granting it to have proved to the interior commerce of the country, of some little utility, has the mischief done to the fields through which it passes, been taken into the account, as a counterbalance?

So many brooks and springs, diverted from their course, and collected from every quarter, to be swallowed up in one great navigable canal, must have ceased to water a very considerable extent of land. And can that be considered as beneficial to commerce, which is injurious to agriculture? Canals are adapted to marshy places only; and the constructing them, in such places, is the third method I shall mention, of restoring the salubrity of the air. The attempts made in France to dry up the marshes, have cost us always a great many men, and have frequently, for that very reason, been left very incomplete. For this failure I can discover no other cause but the precipitancy with which such works are undertaken, and the multiplicity of objects which they are intended to embrace. The engineer presents his plan, the individual who is to execute it his estimate, the minister approves, the prince finds the money, the intendant of the province the labourers; all things happily concur to effect what is proposed, nature excepted. From the bosom of rotten earth, putrid emanations arise, which presently scatter death among the workmen, and put an end to the work. As a remedy to these inconveniencies, I shall suggest some observations, which I conceive to be founded in truth. A piece of land covered entirely with water is never unwholesome. It becomes so only when the water which covers it evaporates, and exposes to the air the muds of its bottom and sides. The putridity of a morass might as effectually be remedied, by transforming it into a lake, as into dry ground; and which of these two objects is to be preferred must be determined by its situation. If it be in a bottom, without declivity, and without efflux, the indication of nature ought to be followed, and the whole covered with water. If the water be inadequate to form a complete inundation, deep ditches might be cut, and the materials dug out be thrown on the adjoining lands, to manure them. Thus we should have, at once, canals always full of water,

and small islands that would both be fertile and wholesome. As to the season proper for such labours, the spring and autumn ought to be preferred; and care should be taken to keep the labourers with their faces to the wind, and to prevent, by means of machinery, their plunging into the mires and muds, which they must otherwise necessarily do, to clear them away.

I have always thought it unaccountable, that, in France, where there are so many judicious establishments, we should have ministers of superintendence for foreign affairs, for war, the marine, finance, commerce, manufactures, the clergy, public buildings, horsemanship, and every thing else, yet no minister for agriculture. It proceeds, I fear, from the contempt in which we hold the peasantry. All men, however, are sureties for each other; and, independently of the uniform stature and configuration of the human race, I would require no other proof, that they all spring from the same origin. It is from the pool by the side of the poor man's hovel, which has been robbed of its current by some caprice of luxury, that the epidemic plague shall issue, which devours the lordly inhabitants of the neighbouring castle. Egypt, by the pestilence arising out of the canals, avenges herself of the oppression of the Turks, who prevent her inhabitants from keeping them in repair. America, sinking under the strokes of European tyranny, exhales from her bosom a thousand maladies fatal to Europe, and drags down with her the haughty Spaniard expiring on her ruins. Thus the Centaur left with Deianira his robe, empoisoned with the blood of the Hydra, as a present which should prove fatal to his conqueror. Thus the miseries accumulated on mankind, pass from huts to palaces, from the line to the poles, from ages past to ages yet unborn; and their long and lingering effects are a fearful voice crying in the ears of the potentates of the earth: "Learn to be just, and not to oppress the miserable."

Not the elements only, but reason itself, in the haunts of wretchedness, becomes corrupt. What torrents of error, fear, superstition, discord, have burst forth in the lower orders of society, and disturbed the tranquillity of thrones? The more men are oppressed, the more miserable are their oppressors, and the weaker is the nation of which they are composed: for the force which tyrants employ to support their authority at home, is never exercised but at the expence of that which might be employed to maintain their respectability abroad.

First, from the gulph of misery issue prostitutions, thefts, murders, conflagrations, highway robberies, revolts, and a multitude of other physical evils, which, in all countries, are the plagues consequent upon tyranny. But the evils of opinion are still more terrible. One man is desirous of subjugating another, not so much for the sake of seizing upon his property, as to command his admiration, and even his homage. Ambition proposes to itself no boundary short of this. To whatever condition the votary of this passion may have reduced the object he has to deal with, though the fortune, the labour, the wife, the persons of his adversary, be at his discretion, unless he has gained his respect and reverence he has gained nothing. It was not enough for Haman to have the life and property of the Jews at his disposal; he must see Mordecai prostrate at his feet. Oppressors thus render the oppressed the arbiters of their happiness; and those, for the most part, repaying them injustice for injustice, beset them, on every side, with false reports, with religious terrors, with revilings and calumnies, which engender among them suspicions, apprehensions, jealousies, feuds, law suits, duels, and, at last, civil wars, which terminate in their total destruction.

Let us examine a few instances of ancient and modern governments as to this re-action of evils upon each other, and we shall find its extent to be in proportion to the mis-

chief which these governments bring upon mankind; and from contemplating so formidable a balance, we shall be led to acknowledge the existence of a sovereign justice.

Without attending to the common divisions of governments,* into democracy, aristocracy, and monarchy, which

* Politicians, in classing governments by these exterior resemblances of form, have acted precisely as those botanists do, who comprehend in the same category, plants which have similar flowers or leaves, without paying to their virtues the smallest attention. The botanist classes together the oak and the pimpernel; the politician, the Roman Republic and that of St. Marino. This is not the way however of observing nature. She is every where nothing but accordance and harmony. It is her spirit, not her forms, that it behoves us to study.

If, in the history of a people, you do not attend to its moral and internal constitution, which scarcely any historian keeps steadily in view, it will be impossible to conceive how republics, well constituted in appearance, have suddenly sunk into ruin; how others, on the contrary, in which all was agitation, became formidable; whence the duration and the power of despotic states, so much decried by modern authors; and, how happened it, that, after the glorious reigns of Marcus Aurelius and of Antoninus, which the same writers have so highly extolled, the Roman empire should terminate its progress in dissolution. The reason was, I have no hesitation in affirming it, because the good princes thought only of preserving the exterior form of their government. All was tranquility around them; the form of a senate remained; Rome was amply supplied with corn; the garrisons in the provinces were regularly paid; there was no sedition; no disturbance; every thing, to appearance, went on well. But during this lethargy, the rich were increasing their before unwieldy property, while the people lost the little they possessed. The great offices of the state were engrossed by the same families. To obtain the means of subsistence, it was necessary for the commonalty to attach themselves to the great. Rome contained a populace of mere menials. The love of country was extinguished. The wretched were ignorant of what to complain. No one did them wrong. All was orderly: but this very order precluded the possibility of their ever arriving at any thing. The citizens had not their throats cut, as in the days of Marius and Sylla; they were stifled.

In all associations of mankind, there are two powers, the one temporal, and the other spiritual. You find them in all the governments of the world, whether you look to Europe, to Asia, to Africa, or to America. The human race is governed in the same way as the human body. Such is the will of the author of nature, for the preservation and happiness of mankind. When the people are oppressed by the spiritual power; they

in fact, are only so many political forms that decide nothing, either as to their happiness, or their power, we shall dwell only on their moral constitution.

Every government, of whatever description, when it bestows on all its subjects, without exception, their natural right of acquiring fortune and honours, is happy at home and respectable abroad; and when it reserves to a particular class of citizens, the benefits which ought to be common, the reverse is sure to take place. It is not sufficient to prescribe limits to the people, and to restrain them within those limits by terrifying phantoms, they quickly compel those who put them in motion, to tremble more than themselves. When human policy fastens one end of the chain to the ancle of a slave, divine justice rivets the other round the neck of the tyrant.

Few republics have been more equally constituted than that of Lacedemon. Virtue and happiness were seen to flourish there, during a period of five hundred years. Notwithstanding the narrowness of its extent, it gave laws to Greece, and to the northern coasts of Asia; but, as Lycurgus had not comprehended in his plan either the nations which Sparta was to subdue, or even the Helots, who cultivated the ground for her, commotions were introduced by them, which shattered her constitution, and at length totally subverted it.

In the Roman Republic, there subsisted still greater equality, and accordingly more happiness and power. It was divided, indeed, into patricians and plebeians; but as these

resort for protection to the temporal; when the temporal oppresses them in its turn, they have recourse to the spiritual. When both concur to render them miserable, heresies, schisms, civil wars, and a multitude of secondary powers spring up, which balance the abuses of the first two, till at length a general apathy is the result, and the state falls into dissolution. We shall presently, when we come to speak of France, investigate this interesting subject; and we shall find that, though there be but one power which governs, by right, there are five which govern, in fact.

last were capable of attaining the highest military dignities, as they possessed, beside, an exclusive title to the tribunitial office, the power of which equalled, and even surpassed, that of the consuls, the utmost harmony prevailed between the two orders. It is impossible to observe without emotion the deference and respect which the plebeians paid to the patricians during the happiest periods of the republic. They selected their patrons from that order; they attended them in crowds to the senate; when they happened to be poor, they assigned themselves, to make up a marriage portion for their daughters. The patricians on the other hand, took an interest in all the affairs of the plebeians; they pleaded their causes in the senate; permitted them to bear their names; adopted them into their families, and, when they distinguished themselves by their virtues, gave them their daughters in marriage. These alliances with families of the people were not disdained even by emperors. Augustus gave his only daughter, Julia, in marriage to the plebeian Agrippa. Virtue sat enthroned, as it were, in Rome; and there is no spot on the earth where altars more worthy of her have been erected. Of this a judgment may be formed, from the rewards assigned there to illustrious actions. A criminal was sentenced to be starved to death in prison; his daughter gains access to him, and nourishes him with her milk. The senate informed of this proceeding, orders the father to be restored to the affection of the daughter, and, in place of the prison, that a temple be reared sacred to filial piety. When a culprit was leading to execution, if a vestal happened to pass that way, he was pardoned. The punishment due to criminality, disappeared in the presence of of virtue, and was remitted. If one Roman saved another in battle from the hands of the enemy, he was entitled to the civic crown. This crown consisted merely of leaves of the oak, and was, indeed, the only military crown which had nothing golden about it; but it conferred the right of

sitting, in the public theatres, on the bench adjoining to that which was allotted to senators, who, as a mark of deference, all rose up on the entrance of the person who wore it. It was the most illustrious, says Pliny, of all crowns, and conferred higher privileges, than either the mural, the obsidional, or the naval crown, because there is more glory in saving a single citizen, than in taking cities, or in gain-battles. It was the same thing, whether the person saved was commander in chief or a private soldier; but to have rescued an allied king, who might have come to the assistance of the Romans, did not entitle to the recompense: for Rome, in the distribution of rewards, distinguished only the citizens. It was by means of such sentiments that she conquered the earth; but she was just only to her own people, and by her injustice to others, she became weak and unhappy. Her conquests filled her with slaves, who, under Spartacus, brought her to the very brink of destruction, and who, at last, decided her fate by the arts of corruption, which are more formidable than the arms of war. They were the vices and flattery of the Grecian and Asiatic slaves at Rome, that formed within her bosom the Catilines, the Cæsars, and the Neroes; and while their voice was corrupting the masters of the world, that of the Goths, the Cimbri, the Teutones, the Gauls, the Allobroges, the Vandals, the companions of their lot, it was inviting, from the north and from the east, their compatriots, who, at length, levelled her glory with the dust.

Modern governments exhibit a similar re-action of equity and happiness, of injustice and misfortune. In Holland, where the people may aspire to every thing, abundance pervades the whole states, order prevails in the towns, fidelity in wedlock, tranquillity in the general mind; disputes and lawsuits are rare, because, in that country, every one is content. There are few nations in Europe with a territory so contracted, and not one, at the same time, that has

extended its power so far. Her riches are immense ; she maintained, singly, a successful war against Spain, in all its splendor, and afterwards against France and England united ; her commerce extends over the whole globe ; she possesses powerful colonies in America, thriving settlements in Africa, formidable kingdoms in Asia. But if we trace to their source the calamities and the wars with which, for two centuries past, she has been visited, it will be found that they proceed from the iniquity of some of her settlements in those countries. Her happiness and her power are not to be attributed to her republican form of government, but to that community of benefits, which she presents indiscriminately to all her subjects, and which would produce the same effects in despotic governments, terrible as are the pictures which are drawn of them.

Among the Turks, as among the Dutch, there is neither quarrelling, nor calumniating, nor stealing, nor prostitution in the cities. There is not to be found, perhaps, over the whole empire, a single Turkish woman carrying on the trade of a courtesan. In the general mind, there is neither restlessness nor jealousy. Every man sees, without envy, in his superiors, a felicity attainable by himself, and is at all times ready to lay down his life for the religion and government of his country. Their force without is by no means inferior to their union within. With whatever contempt our historians may speak of their ignorance and stupidity, they have made themselves masters of the finest provinces of Asia, of Africa, of Europe, and even of the empire of the Greeks themselves, with all their wit and learning, because the sentiment of patriotism which unites them, is more than a match for all the talents and all the tactics in the world. They experience, however, frequent convulsions, from the revolting of the conquered nations ; but the most dangerous proceed from their feeblest adversaries, from those very Greeks, whose property they plunder with

impunity, and whose children they annually carry off, as a tribute to recruit the seraglio. From these same children issue, by a re-acting providence, most of the janizaries, the agas, the pachas, the bashaws, the viziers, which oppress the Turks, in their turn, and render themselves formidable even to their sultans.

It is this same community of hopes and of fortunes presented, without distinction, to all conditions of men, which has given so much energy to Prussia, whose internal police and external victories have been so highly celebrated by our political writers; though its government is still more despotic than that of Turkey, since the prince there is at once absolute master, both as to temporals and spirituals.

The republic of Venice, on the contrary, so well known for her courtezans, and the restlessness and jealousy of her government, is extremely feeble abroad, though she be of higher antiquity, and placed in a more advantageous situation, and under a finer sky than Holland. Venice is a maritime power in the Mediterranean at present hardly acknowledged, whereas Holland is enlivening the whole earth by her commerce; because the first has restricted the rights of humanity to the class of nobility, and the second has extended them to the whole mass of the people.

It is from the influence of the same unjust partition, that Malta, with the finest port in the Mediterranean, situated between Africa and Europe, in the vicinity of Asia, and abounding with a young nobility of undaunted courage, will ever remain the last power in Europe, because the people there are reduced to nothing.

It may be observed, that hereditary nobility in a state extirpates, at once, all emulation, as well in the nobles, as in the commonalty. It is destroyed in the first, because, being entitled by birth to an assumption of every thing, they have no need to call in the assistance of merit; and in the second, because, being excluded by birth from pretending to any

thing, no degree of merit could avail them. This is the political vice which has undermined the power of Portugal and of Spain; and not the monastic spirit, as so many writers have asserted. From the times of Ferdinand and Isabella the monks were every thing. It was a monk who decided at court the expedition of Christopher Columbus in search of a new world, the conquest of which quadrupled in Spain the number of its gentry. There was not a soldier who went over to America, but gave himself out for a man of family, and, returning to Spain with money in his pocket, he was able to maintain his pretension. The same circumstance happened to the Portugueze in their conquests in Asia. The military order in both these nations, performed at that time prodigies of valour, because the career of ambition, in feats of arms, was then open to the commonalty. But since it has been shut against them, by the numerous gentry which abound in those states, the balance has turned in favour of the monastic order, and upon this order the tribunitial power has been conferred.

Admirable as the triple knot may appear, in our theoretical speculations, which constitutes the government of Great Britain, it is to the violent agitations of its three powers we must ascribe the perpetual quarrels which disturb her happiness, and the venality which has at length corrupted her. The commons, it is true, form one of the houses of parliament; but the right of sitting in it, as a representative, being restricted to persons of a certain landed revenue, its doors must necessarily be shut against the admission of many a wise head, and be open to others of a very different description. Alcibiades and Catiline might have made a splendid figure there; but Socrates, Aristides the Just, Epaminondas, who transferred to Thebes the Empire of Greece, Attilius-Regulus, who was called from the plough to the dictatorship, Menenius Agrippa, who settled the dispute between the senate and people, could never have

obtained a seat, because they would have been destitute of an estate in land equal to the qualification required. Britain would destroy herself by this boasted constitution, did she not present, in her marine, a common career to every citizen. All orders of the state concur in this point of union, and give it, thereby, a preponderancy that fixes the political equilibrium. Whoever could destroy the marine of England, would annihilate her government. This unanimous concurrence of the whole nation towards the cultivation of a single art, has raised that art to a height of perfection hitherto unattained in any other country, and has rendered it the sole instrument of her power.

If we turn to other states bearing the name of republics, we shall observe their internal evils and external weakness to increase, in proportion to the inequality prevailing between the citizens. Poland has reserved all the authority to the nobility alone, and left her commonalty in the most detestable slavery; so that war, which establishes between the citizens of one and the same state, a community of danger establishes there no community of reward. Her history exhibits little else than a series of quarrels between palatinate and palatinate, city and city, family and family, which have always been the means of rendering her miserable to an extreme. The nobility themselves are, for the most part, reduced to such wretchedness, that they are obliged for a subsistence to serve the grandees in the most despicable employments, as our own nobility formerly did under the feudal government, and as is the case to this day in Japan: for wherever the peasantry are slaves, the yeomanry are menials. The calamity has, at length, overtaken Poland, in our own days, which would have fallen upon her long ago, had not the kingdoms which surround her laboured, in their respective constitutions, under the same defects. She has been invaded and parcelled out by her neighbours, in despite of her long political discussions,

as the empire of the Greeks was invaded by the Turks, at a time when certain priests, who had got possession of the public mind, were amusing the people with theological subtleties.

In Japan, the wretchedness of the nobles is in proportion to their tyranny. They formed at first a feudal government, so easily subverted, like all others of the same description, since the first chief who aspired at the sovereignty, effected his purpose by a single battle. He took from them the power of determining their quarrels by civil wars, but left them in full possession of their other privileges, namely, that of abusing, as they please, the peasants, who are serfs, and the power of life and death over every one who is in their pay, and even over their wives. The mass of the people, who, in extreme misery, have no way of subsisting, but by intimidating or corrupting their tyrants, have hence produced, in this country, an incredible multitude of bonzes, of all sects, who have erected temples on every mountain; comedians and drolls, who have theatres at every cross street of their cities; and courtezans in such abundance, that the traveller is pestered with them in all the roads through which he travels, and at every inn where he stops. But this very people set so high a value on the consideration exacted of them by the nobles, that if so much as a cross look were to pass between two of those gentry, the parties are obliged to fight, and if the insult be at all serious, it is absolutely necessary that both the aggressor and the person offended should each rip up the other, under pain of infamy. To this hatred of its tyrants is to be imputed the singular attachment which the Japanese expressed for the christian religion, because they hoped it was to efface, by its morality, distinctions so abominable between man and man; and to popular prejudices must be referred, in the same manner, in the nobility of that country, the contempt which they expressed on a thousand occasions, for a life rendered so precarious from the opinion of another.

A wise equality, proportioned to the understanding and talents of its subjects, had long rendered China the happiest spot on the globe; but a taste for pleasure having, at last, corrupted its morals, money, the instrument of procuring it, is become the moving principle of the government. Venality has divided the nation into two great classes, the rich and the poor. The ancient degrees of rank, which, in that country, elevated men to all the public offices, still exist, but the rich only fill them. This vast and populous empire, possessing no longer any patriotism, but what consists in certain empty ceremonies, has frequently been invaded by the Tartars, who were invited thither solely by the calamities of the people.

Of all the descriptions of men existing upon the face of the earth, the negroes are considered, in general, as the most unfortunate. It looks, indeed, as if some destiny had doomed them to slavery. Accordingly, the ancient curse pronounced by Noah,* is by some actually believed to be still in effect: "Cursed be Canaan! a servant of servants shall he be unto his brethren." They confirm it also themselves, by their traditions. If we may credit a Dutch traveller of the name of Bosman, "The negroes of the coast of Guinea allege, that God, having created black men and white, proposed to them the power of choosing between two benefits, namely, the possession of gold and the art of reading and writing; that the first choice being given to the blacks, they preferred gold, leaving the knowledge of letters to the whites, which was accordingly conferred upon them: but that the creator, provoked at their appetite for gold, which they had manifested, immediately passed a decree, that the whites should have eternal dominion over them, and that the

* Genesis, chap. ix. verse 25.

"negros should for ever be subjected to them as slaves."* I do not mean to support, either by sacred authority or their own traditions, the tyranny exercised by us over these unfortunate beings. If the malediction of a father has been able

* *Bosman's Voyage to Guinea, letter x.* This decision of modern negros is highly to their honour. The inestimable value of knowledge is felt by them. But, could they have seen, in Europe, the lot of most men of letters, compared with the condition of those who possess gold, their tradition would have been reversed.

Similar opinions may be traced through other African tribes, and particularly among the blacks of the Cape de Verd Islands, as may be seen in the excellent account given of them by George Robert. This unfortunate navigator was obliged to fly for refuge to the island of Saint John, where he received from the inhabitants the most affecting proofs of generosity and hospitality, after having experienced from his countrymen, the English pirates, who plundered his vessel, the most cruel and atrocious treatment.

Meanwhile, if some African tribes excel us in moral qualities, it must be acknowledged, that the negros, in general, are very inferior to other nations in qualities of the understanding. They have never discovered the address of managing the elephant, as the Asiatics have done. They have brought to perfection no species of cultivation, and are indebted even for that of the greatest part of their alimentary vegetables to the Portuguese and the Arabians. They practise no one of the liberal arts, which had made, however, some progress among the inhabitants of the New World, who are much more modern. They are situated on a part of the continent, from whence they might easily have penetrated into America, as the winds which blow thither from the east are favourable; but so far from this, they had not even discovered the islands in their neighbourhood, such as the Canaries, and the Cape de Verd islands. The black powers of Africa have never in understanding, been equal to the task of constructing a brigantine. So far from attempting to extend their boundaries, they have permitted strangers to take possession of all their coasts. For, in ancient times, the Egyptians and Phenicians settled on their eastern and northern shores, which are now in possession of the Turks and Arabians: and, for an age or two past, the Portuguese, the English, the Danes, the Dutch, and the French, have seized upon what remained to the east, the south, and the west, simply for the purpose of procuring slaves. A particular providence, after all, must have preserved the patrimony of these children of Canaan from the avidity of their brethren, the children of Shem and Japhet: for how else is it to be accounted for, that we in particular, the sons of Japhet, who, as younger brothers, had to seek

to diffuse such influence over his posterity, the benediction of God, which, under the Christian religion, extends alike to the whole human race, re-establishes them in all the liberty of the law of nature. The precept of christianity, which enjoins to us to consider all men as brethren, speaks for them, as well as for our own countrymen. If this were the proper place, I could shew how providence enforces in their favour the laws of universal justice, by rendering their tyrants, in our colonies, a hundred times more wretched than themselves. How many wars, also, have been kindled among the maritime powers of Europe, on account of the African slave trade? How many maladies and deteriorations of blood in families, have not the negros occasioned among us? I shall confine myself, however, to their condition in their own country, and to that of their compatriots, who abuse their power over them. I am not aware that there ever existed among them a single republic, except, perhaps, some pitiful aristocracy along the western coast of Africa, such as that of Fantim. They are under the dominion of a multitude of petty kings, who sell them at their pleasure. But, on the other hand, the lot of those kings is rendered so deplorable by priests, fetichas, grigris, sudden revolutions, and the very want of the common necessaries of life, that few of our common sailors would be disposed to change conditions with them. Beside, the negros escape from the feeling of a considerable

our fortune all the world over, and who, according to the benediction of our father Noah, were to extend our lodging even unto the tents of Shem, our elder brother, should never have established colonies, in a part of the world so beautiful, and so near to us, as Africa, in which the sugar cane, the coffee plant, and most of the productions of Asia and America might grow, and, in a word, where slaves are the produce of the soil.

Politicians may ascribe the different characters of Negros and Europeans to whatever causes they please. For myself, and I say it with the most perfect conviction, I know of no book, which contains monuments more authentic of the history of nations and of nature, than the book of Genesis.

proportion of their miseries, by the thoughtlessness of their temper, and the levity of their imagination. They dance in the midst of famine, as of abundance; when loaded with chains, as when at liberty. If a chicken's foot inspires them with terror, a slip of white paper restores their courage. Every day they fashion and pull to pieces their gods, as the whim strikes them.

It is not in Africa, remarkable for its hebetude, but in India, renowned for its ancient wisdom, that the miseries of the human race are carried to their highest excess. The Bramins, formerly called Brachmans, who are the priests in that country, have divided the nation into a variety of casts, of which they have devoted some, as that of the parias, to infamy. Their own cast, it will not be doubted, they have rendered sacred. No person is worthy to touch them, to eat with them, and still less to contract with them any kind of alliance. They have supported this imaginary grandeur by the pillars of the most incredible superstitions. From their hands have issued that infinite number of gods, in monstrous forms, which have terrified the human imagination, in every quarter of Asia. The commonalty, by a natural re-action of opinions, renders these priests, in their turn, the most miserable of beings. It obliges them, in order to preserve their reputation, to wash themselves, from head to foot, on the slightest contamination by contact; to undergo frequent and rigorous fastings; to submit to penances the most horrible, before idols which they themselves have rendered so tremendous; and, as this commonalty is not permitted to intermix its blood with them, it constrains, by the power of prejudice over the tyrants, their widows to burn themselves alive with the bodies of their deceased husbands. For men who pass for sages, and who give the law to their nation, it is surely no enviable situation, to be witnesses of the untimely death, under circumstances so shocking, of their female relations and friends, of their

daughters, their sisters, and their mothers. Travellers have boasted of their knowledge: but is it not an odious alternative for men of enlightened minds, to be continually, either terrifying the ignorant, by opinions, which, in the end, are sure to subjugate even those who propagate them; or, if they are so fortunate as to preserve their reason, to make a shameful and criminal use of it, by employing it in the dissemination of falshood? How is it possible for them to esteem each other? How possible to retire within themselves, and lift up their eyes to that divinity, of whom, as we are told, they entertain conceptions so sublime, and of whom they exhibit to the people representations so horrible? Whatever, as to their own ambition, may be the melancholy fruit of their policy, it has involved in its train the misery of this vast empire, situated in the finest region of the globe. Its military is formed of the nobility called Naïrs, who hold the second rank in the state, and whom the Bramins, to support themselves by force, as well as by guile, have admitted to a participation of some of their privileges. Walter Schouten, speaking of the indifference of the common people towards these Naïrs, when any mischief befalls them, expresses himself thus. After a bloody encounter, in which the Dutch had destroyed a considerable number of those who had taken the side of the Portugueze, "no outrage," says he, "or insult was offered to any artizan, peasant, fisherman, or other inhabitant of Malabar, not even in the rage of battle. They, accordingly, never thought of flight. A great many of them, on the contrary, were posted at different places, merely as spectators of the action, and they appeared to take, in the disastrous fate of the Naïrs, not the smallest interest or concern." I have observed in nations the same apathy towards their nobility, when it has formed a separate class, and particu-

* Voyage to the East Indies, vol. I. page 397.

larly in Poland. The commonalty of India subjects the Naïrs, as well as the Bramins, to their share of the miseries of opinion. The Naïrs cannot contract legitimate marriages. Many of them, known by the name of Amocas, are obliged to sacrifice themselves in battle, or upon the death of their kings. They are the victims of their unjust honour, as the Bramins are of their inhuman religion. Their courage, which is merely a professional spirit, far from being useful to their country, is often fatal to it. It has always been desolated by their intestine wars; and it is so feeble without, that handfuls of Europeans have established themselves in it, wherever they pleased. At the close of the war before last, in 1762, it was proposed in the parliament of Great Britain, to complete the conquest of this country, and to liquidate, with the riches which might be extracted from it, the national debt; and the individual who made the proposition offered to undertake the execution of his plan, provided he were to be landed in India with an army of Europeans, consisting of five thousand men. The boldness of the enterprize by no means astonished the house, who were acquainted with the weakness of the country; and it was laid aside, it is said, merely from the injustice of the proceeding.

In France, the people have never acquired the smallest share in the government, from the days of Julius Cæsar,—who was the first to make the observation, and who is not the last politician that has availed himself of it, to render himself thereby the more easily its master,—to the days of Cardinal Richlieu, who levelled the feudal power. During this long interval, our history presents nothing but a series of dissensions, of civil wars, of dissolute manners, of assassinations, of gothic laws, of barbarous customs; and furnishes no materials interesting to the reader, whatever the President Henault may say to the contrary, who compares it with the Roman history. It is not merely because the

fictions of the Romans are more ingenious than ours ; it is because we do not find in our annals the history of a people, but the history only of some great family. From this account, however, must be excepted the lives of some few honest kings, as St. Louis, Charles V. and Henry IV ; as well as of some virtuous individuals of inferior rank, who are interesting to us, for this very reason, that they interested themselves in behalf of the nation. In every other case, it does not appear as if the government thought about the people : it studied only the interest of the nobility. The country was subjugated, in turn, by the Romans, the Franks, the Goths, the Alains, and the Normans. The readiness with which France embraced christianity, is a proof that she sought, in religion, a refuge from the miseries of slavery. To this sentiment of confidence the clergy are indebted for the first rank which they obtained in the state. But they soon degenerated from their primitive spirit ; and so far from meditating the destruction of tyranny, enlisted under the banner of tyrants ; adopted all their customs ; assumed their titles ; appropriated to themselves their rights and their revenues ; and even made use of their arms, to maintain interests which were in direct opposition to their morality. Many churches had their knights and their champions, who supported their claims in single combat.

We must not, however, impute to religion, the mischiefs occasioned by the avarice and ambition of its ministers. It teaches us itself to detect their faults, and warns us to be on our guard against them. The greatest saints, and among others, St. Jerom,* have exposed and reprobated the vices of the clergy, with more vehemence even than our modern philosophers have done. Much has of late been written against religion, with a view to diminish the power of priests. But, universally, wherever it has fallen into dis-

* See his Letters.

credit and been extirpated, their power has increased. It is religion alone that restrains them within due bounds. Look to the Archipelago, and other places, and observe how many fraudulent and lucrative superstitions have been substituted, by the Greek papas and caloyers, for the spirit of the gospel! Beside, whatever reproach may be cast upon our own clergy, they may truly answer, that they have been, in all ages, like the rest of their compatriots, the children of the world, and have swam with the stream. Nobles, magistrates, soldiers, and kings themselves, in former times, were no better than they. They have been accused of introducing every where a spirit of intolerance, and of aiming at superiority, by preaching up humility. But the majority of them, repelled by the world, have been thereby furnished with the example of this intolerance, which they carry with them into their profession, and of which they are the victims: and as to their ambition, it is frequently the mere result of that universal ambition, with which national education, and the prejudices of society, inspire all the members of the state. Without intending to write their apology, and still less to inveigh, with the bitterness of satire, against them, or any body of men whatever, whose errors I have not been desirous of detecting, except for the purpose of indicating the remedies, which seem to me to lie within their reach, I shall confine myself here to a few reflections on religion, which, even in this life, is the avenger of the wicked, and the consolation of the good.

The world, nowadays, considers religion as the concern only of the vulgar, and as a mere political contrivance invented to keep them in awe. The philosophy of Socrates, of Epictetus, of Marcus Aurelius, is placed in opposition to it; as if the morality of those sages were less austere than that of Christ, and the benefits to be expected from it better secured than those of the gospel! What

profound knowledge of the heart of man ; what an admirable conformity to his wants ; what delicate touches of sensibility are treasured up in that divine book ! I leave its mysteries out of the question. Part of them, we are told, have been taken from Plato. But Plato himself borrowed them from Egypt, where he had travelled, and the Egyptians were indebted for them, as we are, to the patriarchs. These mysteries, after all, are not more incomprehensible than those of nature, or than the mystery of our own existence. Beside, we contrive, in examining them, to mislead ourselves. We would fain penetrate to their source, and we are capable only of perceiving their effects. Every supernatural cause is alike impenetrable to man. He is himself merely an effect, a passing result, the combination of a moment. He cannot judge of things divine from *their* nature, but from his own, and from the correspondence which they have with his necessities. If we consult these testimonies of our weakness, and these indications of our heart, in the study of our religion, we shall find that there is no other on the face of the earth, so perfectly adapted to the wants of mankind. I say nothing of the antiquity of its traditions. The poets of most nations, Ovid among the rest, have sung the creation of the world, the happiness of the golden age, the indiscreet curiosity of the first woman, the miseries which issued from the box of Pandora, and the universal deluge, as if they had copied their narrations from the book of Genesis. To the recent existence of the world, the antiquity and multiplicity of certain volcanic lavas have been objected. But have the observations made upon these substances been well founded ? Volcanos must have poured out their torrents more frequently in the earlier ages, when the earth was more amply covered with forests, and the ocean, loaded with its vegetable spoils, supplied a more abundant fuel to their furnaces. Beside, as I have elsewhere said in the course of this work, we are

unable to distinguish, in the structure of the globe, between what is old and what is modern. The hand of creation must have impressed on it the seal of ages, from the moment of its birth. If we suppose it eternal, and abandoned to the simple laws of motion, the period must long since have arrived, when not the smallest hill would have appeared on its surface. The action of the rains, of the winds, and of gravity, would have reduced every particle of land to the level of the seas. It is not in the works of God, but in those of men, we are able to trace epochs. All our monuments announce the late creation of the earth which we inhabit. If it were, I will not say, eternal, but of great antiquity only, we should find productions of human industry much older than from three to four thousand years, which is the date of the oldest we are acquainted with. There are substances on which time makes no perceptible alteration. I have seen in the possession of the learned Count de Caylus, constellation rings of gold, or Egyptian talismans, as entire as if they had just come from the hand of the workman. Savages, who have no knowledge of iron, are acquainted with gold, and search after it as much for its durability as for its splendid colour. Instead, then, of finding antiques of three or four thousand years only, as are those of the most ancient nations, we ought to possess memorials of sixty, a hundred, and even two hundred thousand years. Lucretius, who ascribes the creation of the world to atoms, on a system of physics altogether unintelligible, admits it to be a recent production.

Præterea, si nulla fuit genetalis origo
Terraï et cœli, semperque eterna fuere,
Cur supra bellum Thebanum, et funera Trojæ,
Non alias alii quoque res cecinere poetæ ?

De Rerum Naturâ, lib. v. ver. 325.

But grant the world eternal, grant it knew
No infancy, and grant it never new ;
Why then no wars our poets' songs employ
Beyond the siege of Thebes, or that of Troy ?

CREECH.

The earth is filled with the traditions of our scriptures : they serve as a foundation to the religion of the Turks, the Persians, and the Arabians ; they extend over the greatest part of Africa ; we find them again in India, from whence all nations and all arts originally proceeded ; we can trace them in the ancient and gloomy religion of the Bramins,* in the history of Brama, or Abraham, of his wife Saraï, or Sara, in the incarnations of Wistnou, or Christnou ; in a word, they are to be found even among the savage and wandering tribes of America.

I say nothing of the monuments of our religion, as universally diffused as its traditions, of which one, inexplicable on the principles of our physics, proves, by the wrecks of marine bodies scattered over the surface of the globe, a general deluge ; while another, irreconcilable to the laws of our politics, attests the reprobation of the Jews, dispersed over all regions ; hated, despised, persecuted, without government, without a country, yet, notwithstanding these obstacles, always numerous, always subsisting, and always tenacious of their law. In vain have attempts been made to trace resemblances between their condition, and that of several other nations, as the Armenians, the Guebres, and the Banians. These nations scarcely emigrate beyond the confines of Asia ; their numbers are extremely inconsiderable ; they are neither hated nor persecuted by other nations ; they have a country ; and, finally, they have not adhered to the religion of their ancestors. Various authors of celebrity have illustrated these supernatural proofs of a

* See Rogers, on the manners of the Bramins.

divine justice, I mean the general deluge and the reprobation of the Jews, in a very striking light. I shall, therefore, confine myself to some other instances of this divine justice, and those of a kind still more affecting, from their correspondence to nature and to the necessities of mankind.

The morality of the gospel has been attacked, because Jesus Christ, in the country of the Gadarenes, permitted a legion of demons to take possession of a herd of two thousand swine, which were thereby precipitated into the sea. Why ruin, it is asked, the proprietors of those animals?—Jesus Christ acted in this case as a legislator. The persons to whom the swine belonged were Jews; they transgressed, therefore, the law which declares those animals unclean.—But here another question, levelled at Moses, is asked: Why are those animals pronounced to be unclean?—Because, in the climate of Judea they are subject to the leprosy.—And here again is afforded a fresh triumph for our wits. The law of Moses, say they, related, then, to climate, and was, accordingly, not a religious but a political law.—To this I answer, that if I found, in either the Old Testament or the New, any usage whatever, which did not harmonize with the laws of nature, I should be still more astonished. It is the character of a religion divinely inspired, to be perfectly adapted to the happiness of man, and to laws antecedently enacted by the author of nature. From this want of correspondence, all false religions may be detected. And as to the point in question, the law of Moses, from its privations, was evidently intended to be the law of a particular people; while that of the gospel, from its universality, must have been intended for the whole human race.

Paganism, Judaism, Mahometanism, have all prohibited the use of some species or other of animal food; so that, if one of those religions were to become universal, it would produce the total destruction of such animals, or else their

unbounded increase, which would manifestly counteract the plan of the creation. The Jews and Turks proscribe pork; the Indians of the Ganges revere the heifer and the peacock. There is no animal existing, which has not served as a fetichâ to some negro, or a manitou to some savage. The christian religion alone permits the necessary use of all animals; and prescribes abstinence from those of the land, only at the season when they are procreating and when those of the sea abound on the shores, which is early in the spring. All other religions have filled their temples with carnage, and immolated to the deity the animals of his creation. The Bramins, so full of compassion to the beasts, present to their idols the blood and life of men; the Turks offer in sacrifice camels and sheep: but our religion, more pure as to the articles of its sacrifice, presents in homage to the creator bread and wine, the most delicious gifts which he has bestowed on man; for the vine, it may be observed, is the most widely diffused of all fruit trees; it grows from the equator to the fifty-second degree of north latitude, and from England to Japan; corn too is almost the only alimentary plant, which thrives, in like manner, in all climates; and the juice of the one, and the flour of the other, is capable of being preserved for ages, and of being transported to every corner of the earth. All other religions have accorded to men a plurality of wives; whereas christianity restricted them to one, long before our politicians had observed that the two sexes are born in nearly equal numbers. All other religions have boasted of their genealogies; and, regarding with contempt the majority of nations, have permitted their votaries, whenever they have been able, to reduce them to slavery; while ours alone has protected the liberty of all men, and has recalled the nations of mankind to one and the same destination, as to one and the same origin. The religion of the Indians promises pleasure in this world; that of the Jews, riches; that of the Turks,

conquest; on the contrary, our's enjoins the practice of virtue, and places the reward of it in heaven. Christianity alone knew that the passions of men, infinite in their variety, were of divine original. It has not limited love, in the heart of man, to wife and children, but extends it to the whole human race; it has not circumscribed ambition to the narrow sphere of a party, or to the glory of a nation, but has directed it to heaven and immortality; and it intended that our passions should serve as wings to our virtues.* So far from uniting us on earth, to render us

* Religion alone gives a sublime character to our passions. It diffuses charms ineffable over innocence, and communicates a divine majesty to grief. Of this I shall quote two instances. The one is extracted from an account, held, indeed, in no great estimation, of the island of St. Erini, (chap. xii.) by Father Francis Richard, a Jesuit missionary; but which contains some things that please me, from their simplicity. Of the other I was myself a witness.

"After dinner," says Father Richard, "I retired to St. George's, which is the principal church of the island of Stampalio. While there, one of the papas presented to me a book of the Gospels, in order to discover if I could read their language as well as I spoke it. Another asked me, whether our holy father the pope was a married man or a bachelor. But what amused me most was the question of an old woman, who, after looking for a considerable time steadily in my face, besought me to tell her, if I really believed in God and the Holy Trinity. Yes, said I, and to give her assurance of it, I made the sign of the cross. Oh, how glad I am, says she, that you are a christian! We had some doubt of it. Upon this, I took from my bosom the cross which I wore, and the woman, transported with joy, exclaimed, why should we any longer doubt his being a good catholic, seeing he worships the cross? After her, came another woman, of whom I asked, whether she had a mind to confess. How! replied she, would it not be a sin then to confess to persons like you? No, said I, for though I am French, I confess in Greek. I will go, replied she, and ask our bishop. In a short time she returned, perfectly delighted with having obtained his permission. After confession, I gave her an *Agnus Dei*, which she went about showing to every one, as a curiosity which they had never seen before. I was presently beset by a multitude of women and children, requesting of me similar presents. I answered, that they were given only to such as confessed. To gain their point they all instantly offered to confess, and wanted to do so by pairs; that is to say, a young girl with her female confidant, a young man with his bosom

miserable, it has burst asunder the chains by which we were held captive. How many calamities has it soothed; how many tears has it wiped away; how many hopes has it inspired, even when there was no room for hope; how many doors of mercy has it thrown open to the guilty; how many supports given to innocence? When its altars arose in the midst of our forests, empurpled by the murderous knives of the druids, how did the oppressed flock to them in search of an asylum? How many enemies, before implacable, embraced with tears? Tyrants, melted to pity, felt, from the

“ friend, whom they denominate *adelphospathon*, confidential brother, alledging
 “ as a reason, that they had but one heart, and that therefore, there ought to
 “ be no secret between them. It was with difficulty I could separate them,
 “ but at last I obliged them to submit.”

Some years ago, being at Dieppe, about the autumnal equinox, and a gale of wind having sprung up, as is common at that season, I went to observe its effects on the sea shore. The time, I believe, was about noon. Several large boats had gone out of the harbour in the morning, on a fishing expedition. While I was observing the manœuvres of these boats, I perceived a company of village maidens, handsome, as the Cauchoises generally are, coming out of the city, with their long white head dresses, which the wind blew in various directions about their faces. They advanced, in a playful humour, to the extremity of the pier, which was, from time to time, covered with the spray, occasioned by the dashing of the waves—all but one, who kept apart from the rest, sad and thoughtful. She looked wistfully at the distant boats, of which some, from the blackness of the horizon, were scarcely perceptible. Her comrades, at first, began to rally, with the view of amusing her: what, said they, is your sweetheart yonder? But finding her inflexibly pensive, they called out, come, don't let us stop any longer: why do you make yourself so uneasy? Return, come return with us, and they resumed the road that led to the town. The young woman, without replying, followed them with a lingering pace, and when they were nearly out of sight, concealed by some heaps of pebbles which were on the road, she approached a large crucifix, that stands about the middle of the pier, and taking some money out of her pocket, and dropping it into the little chest at the foot of the cross, she kneeled down, and with clasped hands, and eyes lifted fervently to heaven, offered up her prayer. The deafening noise of the billows breaking on the shore, the wind which agitated the large lanterns of the crucifix, the danger at sea, the uneasiness on land, confidence in heaven, gave to the love of this poor rustic maiden an extent and a dignity,

height of their towers, their arms drop from their hands. They had known the empire only of terror, and they saw charity springing up in its stead. Lovers ran thither to mingle their vows, and to swear a mutual affection, which should survive even the tomb. Not a day was allowed to hatred, while eternal ages were promised to love. Ah! if this religion had been calculated only for the consolation of the miserable, it would be proof sufficient that it was designed for the human race!

Whatever reproaches may have been cast upon the church of Rome for its ambition, it has frequently interposed in behalf of suffering humanity. I shall cite the first instance that occurs to me, and shall submit it, without comment, to the judgment of the reader. It is on the subject of the African slave trade, which, practised without scruple by all the christian and maritime powers of Europe, is, by the court of Rome, condemned. "In the second year of his mission, Merolla was left alone at Sogno, by the death of the superior general, whose place father Joseph Bulsetto was sent to fill at the convent of Angola. It was about the same period that the capuchin missionaries received a letter from cardinal Cibo, in name of the sacred college, containing severe animadversions on the

which the palaces of the great have never been able to communicate to their passions. It was not long before her tranquillity was restored to her: for the boats a few hours after, gained the harbour, without having sustained the slightest injury.

Religion has been often calumniated, in consequence of our political evils, which have all been laid to her charge. Hear, however, what Montagne, who lived in the midst of its civil wars, says upon the subject: "Let us confess the truth: whoever should select from the army, even the most legally embodied, those who serve in it from the zeal of a religious affection, and should add to them, such as are influenced only by the protection of the laws of their country, or the service of the prince, would find it difficult to form from these sources, a single complete company of soldiers."

Essays, book ii. chap. xii. page 317.

“ continuation of the sale of slaves, and earnest remonstrances, to put an end to this abominable traffic. But the missionaries saw little appearance of having it in their power to execute those orders of the holy see, as the commerce of the country consists entirely in ivory and slaves.”* All their efforts ended simply in excluding the English from a share in the traffic.

If the christian religion were universally observed, the earth would be a paradise. It is christianity which has abolished slavery in the greatest part of Europe. It wrested in France, enormous possessions out of the hands of the earls and barons, and destroyed there a part of their inhuman rights, by the terrors of a life to come. But the people opposed yet another bulwark to tyranny, which was the power of the sex.

Our historians take care to remark the influence which individual women have had under certain reigns, but never that of the sex in general. They do not write the history of the nation, but merely the history of its princes. In their eyes, women, unless decorated with titles, are nothing. It was, however, from this feeble division of society, that providence, from time to time, called forth its principal defenders. I do not speak of those intrepid females, who have repelled, even by arms, the invaders of their country, such as Joan of Arc, to whom Greece and Rome would have erected altars: I speak of those who defended the nation from internal foes, still more formidable than foreign assailants; of those who are powerful from their weakness, and who have nothing to fear, because they have nothing to hope. There is, perhaps, no country in Europe where women, from the palace to the cottage, are so harshly treated by the laws as in France; and there is no country where they have more power. I believe it is the only kingdom of Europe where they are absolutely excluded from the throne.

* Extract from the General History of Voyages, by the Abbe Prevost, book xii. page 180: Merolla, A. D. 1633.

In my province, a father can marry his daughters without giving them any other portion than a mere chaplet of roses, and at his death they have all together the portion only of a younger son. This unjust distribution of property is as common to the peasant as to the gentleman. In other parts of the kingdom, if they are richer, they are not happier. They are rather sold, than given in marriage. Of a hundred young women, who enter into a state of wedlock, there is not, perhaps, one who is united to the object of her choice. Their condition was even still more wretched in former times. Cæsar says, in his Commentaries, "That the husband had the power of life and death over his wife, as well as over his children; that when a man of noble birth died, the relations of the family assembled; if there was the slightest suspicion against the wife, she was put to the torture as a slave; and if found guilty, was condemned to the flames, after a previous process of inexpressible suffering."* Strange, however, as it may seem, they enjoyed, at that very time, and even before, the most unbounded power. The excellent Plutarch has a striking passage upon this subject. "Before the Gauls," says he, "had passed the Alps, and got possession of the part of Italy which they now inhabit, a violent and alarming sedition arose among them, which ended in a civil war. But, as the two armies were on the point of engaging, their wives threw themselves into the intervening space, and taking up the cause of their dissention, decided upon it with such moderation and equity, and so much to the satisfaction of both parties, that a good understanding and the most cordial friendship were the result, and that not only between city and city, but also between family and family: so that ever since their wives are invariably consulted on all deliberations, whether relating to war or peace, and all disputes and differences with neighbours

* Gallic War, book vi.

“ and allies are settled conformably to their advice. Thus,
 “ in the agreement made with Hannibal, when he marched
 “ through Gaul, among other articles, it was stipulated,
 “ that, if the Gauls should have occasion to complain of
 “ any injury done them by the Carthaginians, the cause
 “ should be submitted to the decision of the Carthaginian
 “ officers and governors serving in Spain; and if, on the
 “ contrary, the Carthaginians alledged any complaint
 “ against the Gauls, the matter should be left to the deter-
 “ mination of the wives of the Gauls.”*

To those who do not pay attention to the re-action of human affairs, these two authorities will appear difficult to be reconciled. The power of women proceeds from their oppression. The people, as oppressed as they, gave them their confidence, as they had given their's to the people. They were two unfortunate parties whom misery attracted towards each other, and they made of their sufferings a common stock. They decided with so much the greater equity, as they had nothing either to gain or to lose. To the women is to be ascribed the spirit of gallantry, the thoughtlessness, the gaiety, and particularly the taste for raillery, which have at all times characterized our nation. With a simple song, they have more than once made our tyrants tremble. Their ballads have sent many a battalion into the field, and put to flight still more. It is by them that ridicule has acquired such a prodigious influence in France, as to have become the most terrible weapon which it is possible to wield, though it be the armour only of the weak, because women are the first to lay hold of it, and because their esteem, from national prejudice, being the greatest blessing, it follows, of course, that their contempt must be the most grievous calamity in the world.†

* Plutarch, vol. ii. in folio; *Virtuous actions of women*, page 233.

† A provincial academy, some years ago, proposed the following question as the subject for the prize of Saint Louis: “ In what manner might female education be made subservient in rendering men better subjects of society?”

Cardinal Richlieu, having, at last, restored to kings the legislative authority, thereby stripped the nobility, in a great measure, of the power of injuring each other by civil wars ; but he was not able to abolish among them the rage for duelling, because the root of this prejudice is in the people, and because, when oppressed, edicts have no power over their opinions. The edict of the prince forbids the gentleman to meet his antagonist in the field, while the opinion of his valet de chambre forces him out. The nobility arrogate to themselves all the national honour, but the people determine for them the object of it, and allot its proportions. Louis XIV. however, gave back to the people a part of their natural liberty, by means of his very despotism. As he hardly saw in the world any thing but himself, the rest of mankind appeared in his eyes nearly equal. It was his wish, that all his subjects should be permitted to exert themselves for his glory, and he rewarded them in proportion as their exertions promoted this end. The desire of pleasing the prince, reduced all ranks to a level. Multitudes of celebrated men were then seen, distinguishing themselves in all classes. But the misfortunes of that great king, and perhaps his policy, having obliged him to descend to the sale of employments, of which the pernicious example had been set him by his predecessors, and which has been extended, since his time, to the meanest offices in the state, a finishing stroke was thereby given to the ancient preponderancy of the nobility ; but there sprung up in the nation, a power much more dangerous in its stead, which was that of gold. This has levelled every rival influence,

I wrote upon the question, and was guilty of two faults, in particular, of ignorance, without mentioning others. The first was my presuming to write after Fenelon had composed so excellent a treatise on the education of young women ; and the second, to think of arguing for truth in an academy. The prize, however, was not bestowed, and the academy recalled its subject. All that can be said on this question is, that, in every country, women are indebted for their empire solely to their virtues, and to the interest which they have always taken in behalf of the unfortunate.

and triumphed even over the power of women.* For, in the first place, the nobility having retained a part of their privileges in the country, the trades-people possessed of any fortune do not choose to live there, for fear of being exposed, on the one hand, to insult, and of being confounded, on the other, with the peasantry, by paying tallage, and being drawn for the militia. They had rather reside in small cities, where a multitude of financial employments and revenues enable them to subsist in indolence and listlessness, than vivify the fields, which are supposed to degrade their cultivators. Hence it happens, that small landed estates sink in value, and are every year falling into the hands of the great proprietors. The rich, who make the purchase parry the inconveniences attached to them, by means of their personal nobility, or else by buying off the imposts to which they are subject. I know that a celebrated farmer-general, some years ago, spoke of the overgrown proprietors in terms of commendation, because, as he alleged, they could afford to give a better bargain than the smaller ones: but, without considering whether they sell the corn cheaper, and all the other consequences of the *net produce* of the land, which it has frequently been attempted to establish as the only standard and object of agriculture, and even of morality,—it is certain, that if any

* As men, in general, are shocked at abuses, only when they see them in detail, because every thing great dazzles and commands respect, I shall cite here a few instances of the effect of venality in the lower orders of society. All the subaltern conditions, inferior to others, of right, are become the superiors, in fact, merely because they are richer. Accordingly it is the apothecary, now, who employs the physician; the attorney, the advocate; the handycraftsman, the merchant; the master mason, the architect; the bookseller, the scholar, even the learned ones of the academy; the chair hiree in church, the preacher, &c. I shall say no more. We see to what all this leads. From this venality alone must ensue the decline of all talents; as, indeed, will evidently appear, if we compare those of the age in which we live, with those of the age of Louis XIV.

given number of wealthy families were, year after year, to purchase the lands which might lie commodiously for them, such family bargains would speedily become fatal to the state. I have often been astonished, that there is no law in France to prescribe bounds to the accumulation of landed property. The Romans had censors who limited, in the first instance, the extent of a man's possession to seven acres, as being sufficient for the subsistence of a family, understanding by an acre, as much land as a yoke of oxen can plough in a day. As Rome increased in luxury, it was extended to five hundred : but even this law, though indulgent in the extreme, was soon infringed, and the infraction hastened, rapidly, the ruin of the republic. "Extensive parks," says Pliny,* "and large domains, have ruined both our own Italy, and the provinces which the Romans have conquered : for the victories which Nero (the consul) obtained in Africa, were simply owing to the circumstance of six men being in possession of almost one half of Numidia." Plutarch informs us, that, in his time, under Trajan, a levy of three thousand men could not have been effected in all Greece, which had formerly furnished armies so numerous ; and that sometimes you might have travelled a whole day, on the high roads, without meeting a human being, except now and then, perhaps, a few solitary shepherds. The reason was, that Greece had then been parcelled out among a few wealthy proprietors. In countries where property is so unequally divided, conquerors have always met with a feeble resistance. We have examples of this in all ages, from the invasion of the lower empire by the Turks, to that of Poland in our own days. Overgrown estates destroy alike the spirit of patriotism, in those who have every thing, and in those who have nothing. "The shocks of

* Natural History, book xviii. chap. iii. and vi.

" corn," says Xenophon, " inspire those who have raised them with a courage to defend them. They appear in the fields as a prize exhibited in the middle of the theatre to crown the conqueror."

Such is the danger to which great inequality of property exposes a state from without ; let us view also the mischief which it occasions within. I have heard it affirmed, by a person whose veracity was to be depended upon, that an old comptroller-general, having retired to his native province, made a very considerable purchase in land. His estate was surrounded by about fifty small manors, the annual rent of which might be from sixty to eighty pounds sterling each. The proprietors were honest country gentlemen, who, for many generations, had furnished their country with gallant officers, and respectable mothers of families. The comptroller-general, desirous of extending his lands, invited them to his castle, entertained them magnificently, gave them a taste for Parisian luxury, and concluded with an offer of twice the value of their estates, if they thought proper to dispose of them. The guests, to a man, accepted his offer, imagining they were about to double their revenue, and filled, too, with the hope, no less fallacious to a country gentleman, of securing a powerful protector at court. But the difficulty of placing out their money to advantage, a taste for expence, occasioned by the possession of sums which they had never before seen in their coffers, and frequent journies to Paris, soon reduced the price of their patrimony. By degrees these respectable families disappeared ; and, thirty years afterwards, one of their descendants, who could reckon among his ancestors a long succession of captains of dragoons, and knights of St. Louis, was found, wandering on foot over his paternal inheritance, soliciting the place of keeper of a salt-office, to keep him from starving.

Such is the evil inflicted on the citizens, by the accumulation of many estates in the hands of a single proprietor; and the injury done thereby to the land itself is not less to be deplored. I was, some years ago, at the house of a gentleman in affluent circumstances, in Normandy, who cultivated, himself, a very considerable grass farm, situated on a rising ground, of a very indifferent soil. We walked together round his vast inclosure, till we came to a large space completely overrun with mosses, horsetail, and thistles. Not a blade of good grass was to be seen. The soil, indeed, was at once ferruginous and marshy. He had intersected it with many trenches, to drain off the water, but all to no purpose: nothing would grow. Immediately below, there was a series of small farm-houses, of which the land belonging to them was clothed with grassy verdure, planted with apple trees that were loaded with fruit, and enclosed with tall alders. The cows were feeding among the trees of the orchards, while the country girls sat at the doors of their houses, with their spinning-wheels, singing as they worked. Their rustic and simple lays, repeated from distance to distance under the shade of the trees, communicated to this little hamlet a vivacity, which increased the nakedness and depressing solitude of the spot where we stood, and I asked its possessor, how it happened, that lands so contiguous should present so different an aspect? "They are both of the same nature," said he, "and there formerly stood upon this very spot small houses similar to what you see below. I purchased them, but greatly to my loss. Their late inhabitants, indeed, having abundance of leisure, and but little ground to cultivate, cleared away the mosses and the thistles, manured the soil, and had a plentiful crop of grass. If they wished to plant, they dug holes, and having removed the stones, filled them with good mould, which they collected from the

" bottom of the ditches, and along the sides of the highway.
" Their trees took root, and prospered. But these operations
" would cost me so much time and expence, that I should
" not be repaid even the common interest of my money."

This gentleman, it must be observed, wretched steward as he was, but excellent in heart, was relieving, at that very time, by his charity, most of those ancient farmers who had no longer wherewith to live. Here, then, is another instance of both men and lands rendered useless, by the injudicious extension of property. It is not upon large domains, but in the bosom of industry, that the father of mankind pours out the precious fruits of the earth.

I could easily demonstrate, that enormous property is the principal cause of the multiplication of the poor all over the kingdom ; and that for the very reason which has been adduced in favour of such property, by many of our writers, namely, that it spares men the labours of agriculture. There are a variety of places, where, during a considerable part of the year, the peasants have no employment ; but I shall insist only on their wretchedness, which seems to increase with the riches of the district in which it is their destiny to reside.

The district of Caux, at least as far as my own knowledge extends, is the most fertile country in the world. Agriculture, taking it upon the general scale, is carried there to the height of perfection. The depth of the soil, which, in some places, is from five to six feet, the manure supplied from the stratum of marle on which it is raised, and that of the marine plants on its shores, which are spread over its surface, concur towards clothing it with the most superb vegetables. The corn, the trees, the cattle, the women, the men, are there more handsome and more vigorous than any where else. But, as the laws have assigned in that province, in every family, two-thirds of the landed property to the first-born, you find there the two extremes,

unbounded affluence on the one hand, and extreme indigence on the other. I happened, one day, to traverse this fine country, and I admired as I went its plains, so well cultivated and so extensive that the eye loses itself in the unbounded prospect. Their long ridges of corn, following the undulations of the plain, and terminating only in villages, and castles surrounded with venerable trees, presented the appearance of a sea of verdure, with here and there an island rising out of the horizon. It was in the month of March, and very early in the morning. It blew from the north-east extremely cold. At a distance I perceived something red running across the fields, and making towards the great road, about a quarter of a league before me. I quickened my pace, and came up time enough to observe, that they were two little girls, in red jackets and wooden shoes, who, with much difficulty, were scrambling through the ditch which bounded the road. The tallest, who was about six or seven years old, was crying bitterly. "Child," said I to her, "what makes you cry, and whither are you going at so early an hour?" "Sir," replied she, "my poor mother is very ill: there is not a morsel of broth to be had in all our parish: we are going to that church in the bottom, to see if the curé belonging to it can give us some; and I am crying because my little sister is not able to walk any farther." As she spoke, she wiped her eyes with a bit of ragged canvas, which served her for a petticoat; and, as she raised it to her face, I could perceive that she had no shift on. The abject state of these children, so poor in the midst of plains so fruitful, wrung my heart. The relief which I could afford them was extremely slender. I was then on my way to see misery in other forms.

The number of paupers is so great, in the best cantons of this province, that they amount, in every parish, to a fourth, at least, and, perhaps, to a third part of the inha-

bitants. The evil is continually on the increase. These observations are founded on my personal experience, and on the testimony of several clergymen of the different parishes, of undoubted veracity. Some lords of manors order a distribution of bread to be made, once a week, to the majority of their peasants, to eke out their livelihood. Ye economists, stewards of the public, reflect that Normandy is the richest of our provinces, and extend your calculations and your proportions to the rest of the kingdom ! Substitute, if you please, the morality of the financier for that of the gospel : for my own part, I desire no better proof of the superiority of religion to the reasonings of philosophy, and of the pre-eminence of the national heart to the enlarged views of our policy, than this ; that, in spite of the deficiency imputable to our laws, and our errors of every kind, the state continues to support itself, because charity and humanity almost every where interpose in aid of government.

Picardy, Brittany, and other provinces, are, beyond comparison, still more to be pitied than Normandy. If there are twenty-one millions of persons in France, as is pretended, there must be, at least, seven millions of paupers. This proportion by no means diminishes in the towns, as may be concluded from the number of foundlings in Paris, which amounts, one year with another, to six or seven thousand, whereas the number of children, not abandoned by their parents, does not exceed in that city fourteen or fifteen thousand ; and it is reasonable to suppose, that, among these last, a very considerable number must be the progeny of indigent families. The others, indeed, are in part the fruit of libertinism ; but irregularity in morals proves with equal and even greater force, the misery of the people, as it constrains them at once to renounce virtue, and to stifle the very first feelings of nature.

The spirit of finance has accumulated these evils on the head of the people, by stripping them of the principal means

By which to subsist : but what is infinitely worse, it has tapped, at the same time, the foundations of their morality. They no longer esteem or admire any but those who are making a fortune. If some respect be still paid to talents and virtue, it is merely because these qualifications are considered by them as one of the roads to wealth. Nay, what, in the phrase of the world, is called good company, has hardly any other way of thinking. Now I would fain know, what honourable method there is for a man without money to acquire a fortune, in a country where every thing is venal. He must, at least, intrigue, flatter a party, and secure puffers and protectors ; and for this purpose he must be dishonest, must corrupt, fawn, deceive, adopt another man's passions, good or bad ; in a word, in one shape or another, degrade himself. I have seen persons rise to preferment in various situations of life ; but, and I speak it in the face of day, whatever praise may have been bestowed on their merit, and though many of them really possessed merit, I have never seen, even the most upright, raise himself, and preserve his situation, but by the sacrifice of some virtue.

Let us now look at the re-action of these evils. The people balance, in general, the vices of their oppressors by their own vices. They oppose corruption to corruption. From their prolific womb issues a countless swarm of buffoons, comedians, dealers in luxury of every sort, and even men of letters, who, to flatter the rich, and escape from indigence, spread dissipation of manners and pernicious opinions to the remotest extremities of Europe. It is particularly in the class of the unmarried vulgar, that we find the most powerful bulwark of profligacy opposed to that of rank and wealth. As this is a very numerous body, and comprehends not only the youth of both sexes who, with us, do not form early marriages, but an infinite number of men beside, who, from peculiarity of condition, or want

of fortune, are alike deprived of the honours of society, and of the first pleasures of nature ; they constitute a formidable association, which has the power of disposing of all reputations, and of disturbing the peace of all families. These are the persons who retail, for a dinner, that inexhaustible fund of anecdotes, favourable or unfavourable, which, in every instance, are to regulate public opinion. It is not in the power of a rich man to marry a handsome wife, and enjoy himself at home in his own way : these persons impose upon him the necessity, unless he would be laughed at, that is, under pain of the severest evil which can happen to a Frenchman, of making his wife the central point of all fashionable society ; he must exhibit her at all public places, and adopt the manners which his dictators shall think proper to prescribe, however contradictory they may be to nature, and however destructive of conjugal felicity. While this association, acting as an army regularly embodied, disposes of the reputation and the pleasures of the rich, two of its columns attack their fortunes in front, and that in two different ways, the one employing the method of intimidation, the other that of seduction.

I shall not here confine my reflections to the power and wealth gradually acquired by certain religious orders in particular, but shall take them together and consider them generally. There are politicians who have pretended, that, if France had no convents, it would become too populous. Are England and Holland, then, too populous, and have they then any convents? It betrays, beside, a total ignorance of the sources of nature. The more inhabitants a country contains, the more productive is it. France could maintain, perhaps, four times the people which exist in it at present, if, like China, it were parcelled out into a number of small freeholds. We must not judge of its fertility from its extensive domains. These vast deserted districts yield only a crop in two years, or, at most, two

crops in three years. But with how many crops, and how many men, are small parcels of land covered? Observe, in the vicinity even of Paris, the meadow land of St. Gervais: the soil is, in general, of a middling quality; and, yet, there is no species of vegetable which our climate admits of, but what the industry of cultivation has produced there. You see at once corn and grafs, kitchen-gardens and parterres of flowers, fruit trees and trees of the forest. I have observed in the same patch of ground, cherry trees growing in potatoe beds, vines clambering up the cherry trees, and lofty walnut trees rising above the vines; that is four crops one above another within the earth, upon the earth, and in the air. No hedge is to be seen there, separating possession from possession, but all charmingly intermingled, as in the days of the golden age. Often a young rustic, with a basket and a ladder, mounted on a fruit tree, reminds you of Vertumnus; while a young girl, singing, in some winding of the valley, loud enough to be heard by him, presents the image of another Pomona. If cruel prejudices have struck with sterility and solitude a considerable part of France, and have henceforth consigned the possession of it to a handful of proprietors, why, instead of founders of orders, do there not arise among us founders of colonies, as among the Egyptians and the Greeks? Shall France never have to boast of an Inachus, and a Danaüs? Why oblige the African tribes to cultivate our lands in America, while our own peasantry is starving for want of employment at home? Why do we not transport thither the most miserable of our poor by families; children, old men, lovers, cousins, nay the very churches and saints of the villages, that they may find, in those far distant lands, the loves and the illusions of their country? Alas! had liberty and equality been invited to those regions, where nature does so much with so little cultivation, the cottages of the new world would, at this day, have been preferable to the palaces of the old: will another Arcadia

never spring up in some corner of the earth? When I imagined I had some influence with men in power, I attempted to employ it in projects of this nature; but it was not my fortune to find a single individual sufficiently interested in the happiness of mankind. I have endeavoured to trace, at least, the plan of those projects, that I may bequeath it as a legacy to others; but the clouds of calamity have spread a gloom over my own life, and the possibility of happiness, even in a dream, is no longer my portion.

Other politicians have considered even war itself as necessary to a state, because, as they pretend, it takes off the superflux of mankind. These, also, like the preceding ones, know but little of nature. Independent of the resources to be derived from the division of overgrown property into small estates, which would every where multiply the fruits of the earth, there is no country but what has the means of emigration within its power, especially since the discovery of the new world; and no state, however populous, without immense tracts of uncultivated land. China and Bengal, I conceive, are the countries on the globe which have the most inhabitants. In China, however, there are numerous and extensive deserts, amidst its very finest provinces, because avarice attracts those who should cultivate them to the towns and the vicinity of great rivers, for the convenience of commerce. Many enlightened travellers have made this observation. And as to Bengal, the honest Dutchman I have quoted before, Walter Schouten, says, "that toward the south, along the sea coast, at the mouth of the Ganges, there is a very considerable extent of territory, desert and uncultivated, partly from the indolence and inactivity of the natives, and partly from the incursions of the inhabitants of Arracan, and the dread of crocodiles and other monsters, which devour men, lurking in the deserts, by the side of

"brooks, of rivers, of morasses, and in caverns:"* Obstacles, surely, in a nation where fathers sometimes sell their children for want of the means of supporting them, weak and paltry to an extreme! Bernier, the physician, remarks likewise, in his travels through the Mogul empire, that he found a great many fertile but deserted islands at the mouth of the Ganges.

It is, in general, to the excessive number of bachelors in every country, that must be ascribed the abundance of profligate women, which are always in proportion to each other. This evil, too, is the effect of a natural re-action. As the two sexes are born and die in equal numbers, every male comes into the world, and leaves it, accompanied with his female. Those men, therefore, who devote themselves to a life of celibacy, consign, in reality, an adequate number of females to the same condition. The ecclesiastical order robs the sex of so many husbands, and the social order of the means of subsistence. Our manufactories and machinery, so ingeniously industrious, have destroyed nearly all the arts by which they were enabled to live. Without speaking of those which fabricate stockings, embroidery and cloth, employments, formerly, which occupied so many mothers of families, but which are now entirely engrossed by persons bred to the business, we have taylor, forsooth, shoemakers, male hair-dressers for the ladies; we have men milliners also, and our dealers in linen, gauze, muslin, and artificial flowers, are beings of the same description. Men are not ashamed to assume to themselves the easy and commodious occupations, and to leave the rougher and more laborious ones to the sex. We have females who are dealers in oxen and in pigs, driving through our fairs on horseback; others who are venders of bricks, and who navigate barges, embrowned by the influence of the sun; and some even who

* Walter Schouten's Voyage to the East Indies, vol. ii. page 154.

labour in quarries. In Paris multitudes may be seen, sweating, some under enormous loads of linen, others under heavy water pails; some blacking shoes on the quays, others yoked, like beasts, to little carts. Thus the sexes unsex themselves; the men dwindle into women, the women harden into men. The majority of females, indeed, find it easier to turn their charms to account, than their strength. But what mischief is every day produced by women of the town? What conjugal infidelity, what domestic plunder, what quarrelling, scuffling, duelling, do they occasion! Scarcely has the sun withdrawn itself, when every street swarms with them; they crowd to every place of resort, they lie in wait at every corner for their prey. Others, known by the name, held now in some consideration with the vulgar, of *kept mistresses*, drive to the opera and play-houses in magnificent equipages. At the balls and festivals of the better sort of our trades-people, these women always take the lead. For them, in part, arise in the suburbs of the city, in the midst of gardens in the English taste, gay alcoves in the Egyptian style: for they are all intent upon wasting a fortune.

Thus God punishes the oppressors of a people by means of the oppressed. While the rich are dreaming that they are expending their substance in tranquillity, men, springing from the dregs of society, plunder them in their turn by the torments of opinion; if they are so fortunate as to escape on this side, they fall, on the other, into the hands of profligate females, who, should they miss the fathers, are sure of indemnifying themselves upon the children.

For some years past, an attempt has been made to give encouragement to female virtue, by the institution of festivals called *rosieres*, *rose-feasts*. Be it known, however, that these festivals are for the poor and destitute class of our girls in the country: for as to those who are rich, and our city dames in business, the respect which they owe to their for-

tune, does not permit them to place themselves on a level with the female peasantry, even at the foot of the altar. But you, who are thus vain of bestowing crowns on humble virtue, are you not afraid of blighting it by your touch? Are you aware, that, among nations who really honoured virtue, it was the prince alone, or the voice of the country, that presumed to confer the crown? The proconsul Apronius refused the civic crown to a soldier who had merited it, considering the privilege as belonging only to the emperor; and Tiberius bestowed it, blaming Apronius for not having done it in quality of proconsul.* Are you aware in what esteem virginity was held among the Romans? The vestals had the maces of the prætors borne before them. We have seen, too, that their presence, merely, bestowed a pardon on the criminal going to execution, provided, however, the vestals could affirm, that their passing that way was the effect of accident, and not of design. They had a particular bench also allotted them at the public festivals; and many empreses requested, as the highest honour to which they could aspire, permission to sit among them. And our Paris trades-people would crown our rustic vestals!† Noble and generous effort! They bestow on indigent virtue, in the country, a garland of roses; while vice, in the city, flaunts about glittering with diamonds.

On the other hand, the punishments of guilt appear to me as injudiciously assigned as the rewards of virtue. We frequently hear cried aloud in our streets, these terrible words, *the sentence of condemnation!* but never *the sentence of reward*. Crimes are repressed by punishments of infamy. A single brand inflicted on a criminal, instead of reforming him, plunges him deeper in guilt, and not unfrequently

* Annals of Tacitus, book iii. year 6.

† On the day of such festivals *condescend* also to let them eat at the same table with themselves. See the journals of the festivity, which break out into raptures on this occasion.

hurries his whole family into vice. Where shall an unhappy wretch find refuge, who has been publicly whipped, branded, or pilloried? Necessity has made him a thief; indignation and despair will impel him to murder. His relations, dishonoured in the public estimation, abandon their house, and become vagabonds. His sisters give themselves up to prostitution. These effects of fear, which the hangman impresses on the people, are considered as prejudices which are salutary. But they produce, in my opinion, unspeakable mischief. The vulgar extend them to actions the most indifferent, and convert them into a bitter aggravation of misery. Of this I witnessed an instance on board a vessel, in which I was a passenger, on my return from the Isle of France. I observed that none of the sailors would eat or associate with the cook of the vessel, and would hardly so much as speak to him. I enquired of the captain the reason of this. He told me, that, being at Pégú, about six months before, he had left this man on shore, to take charge of a warehouse which the people of the country had lent him. When night came on, these people locked the door on the outside, and carried away the key with them. The store-keeper being on the inside, and not having it in his power to go out to disburthen nature, was under the necessity of easing himself in a corner. Unfortunately, this warehouse was also a church. In the morning the proprietors came and opened the door; but, observing that the place was polluted, they poured a volley of execrations upon the poor store-keeper, bound him fast, and delivered him over to the executioner, who, if the captain of the vessel, seconded by a Portuguese bishop and the king's brother, had not interposed and rescued him from his hands, would instantly have hanged him. From that moment, the sailors considered their countryman as degraded, from having passed, as they said, through the hands of the hangman.

This prejudice had no existence either among the Greeks or the Romans. There are no traces of it also among the Turks, the Russians, and the Chinese. It does not proceed from a sense of honour, nor even from the shame of guilt; it is derived merely from the nature of the punishment. A man shall be beheaded for the crimes of treason and perfidy, or be shot for desertion, and no stigma be considered as devolving on his family. The people, sunk to the lowest level, despise that only which is peculiar to themselves, and they shew no mercy in their decisions, because they are miserable.

The wretchedness of the lower orders is therefore the principal source of our physical and moral maladies. But there is another remaining behind scarcely less fertile in mischief; I mean the education of children. This branch of political economy engaged, among the ancients, the attention of the wisest legislators. The Persians, the Egyptians, and the Chinese, made it the basis of their government. It was on this foundation Lycurgus reared the fabric of the Spartan republic. We may even affirm, that wherever there is no national education, there is no durable legislation. With us, education has no sort of connection with the constitution of the state. Our most celebrated writers, Montagne, Fenelon, Rousseau, have been sufficiently aware how defective in this respect is our police; but despairing, perhaps, of effecting a reformation, they have preferred the recommending plans of private and domestic education, to patching up the old method and adapting it to all the absurdities of the present state of society. For my own part, as I am tracing our evils to their origin, solely with the view of exculpating nature, and with the hope that some favoured genius may one day arise to apply the remedy, I feel myself bound, as it were, by an engagement, to examine the influence of education on our private happiness, and on that of our country in general.

Man is the only being endowed with sensation who forms his reason on continual observations. His education begins with his life, and ends only with his death. His days would pass away in a state of perpetual uncertainty, if the novelty of objects, and the flexibility of his brain in his infancy, did not give to the impressions of his early years a character that is not to be effaced. It is at that period of life are formed the inclinations and aversions which influence the whole of our existence. Our first affections are likewise the last. They accompany us through all the events with which our journey is checkered. They re-appear in old age, and revive at this last stage the sensibilities of our childhood, with still greater force than those of our maturity. Early habits have an influence even upon animals, and to such a degree as to extinguish their natural instinct. Lycurgus exhibited a striking example of this to the Lacedemonians, in the case of two hounds taken from the same litter, in one of which education had completely triumphed over nature. But still stronger proofs might be adduced in the human species, in which early habit is sometimes found to triumph over ambition. History furnishes innumerable examples of this: meanwhile I shall choose one which has yet obtained no place in history, and is apparently of no great importance, but which is interesting to myself, because it brings to my recollection persons who were dear to me.

When I was in the Russian service, I had frequently the pleasure of dining at the table of his excellency, M. De Villebois,* grand master of the ordnance, and general of

* Nicolas De Villebois was a native of Livonia, but descended from a French family originally from Brittany. In the battle of Francfort, he turned the tide of victory in favour of Russia, by charging the Prussians at the head of a regiment of fusileers of the artillery, of which he was then colonel. This action, added to his personal merit, procured him the blue ribbon of St. Andrew, and soon after the office of grand master of the ordnance, which he

the corps of engineers, to which I belonged. I observed that there was every day served up to him a plate of something, I could not tell what, of a gray colour, and similar in form to small pebbles. He ate very heartily of this dish, but never presented it to any of his guests, though his entertainments were always given in the most elegant style, and all the other dishes indiscriminately recommended to every person at table, of whatever rank. He one day perceived me looking very attentively at his favourite mefs, and asked, with a smile, if I would wish to taste it. I accepted his offer, and found that it consisted of little lumps of curdled milk, salted, and sprinkled with anise-seeds, but so hard and tough, that it required the utmost efforts to

held at the time of my arrival in Russia. Though his credit was then on the decline, he procured me an admission into the service of her imperial majesty, Catherine II. and did me the honour of presenting me to her as one of the officers of his corps of engineers. In concert with general De Bosquet, commander in chief of the corps of engineers, he was also making arrangements for my farther promotion in it, and they both employed all their powers of persuasion to retain me in that service, and endeavoured to render it agreeable by every endearing and polite attention, and by assurances of an honourable and advantageous establishment. But the love of my country, which I had before served, and the desire of serving it again, a desire fed with vain hopes by men of very high character, induced me to persist in demanding my dismissal, which I obtained in 1765, with the rank of captain. Upon leaving Russia, I made an effort in favour of my country, at my own expence, by joining the party in Poland which France had espoused, and was exposed thereby to very great risques, having been made prisoner by the Polanese Russians. On my return to Paris, I presented memorials respecting the state of things in the north to the minister for foreign affairs, in which I predicted the future partition of Poland by the neighbouring powers. This partition some years afterwards took place. I have since endeavoured to deserve well of my country by my services, both military, in the West Indies, in my capacity of captain of the Royal Engineers, and literary in France, and I trust also by my character and conduct: but I have not, hitherto, enjoyed the felicity of experiencing, in my fortune, that the various sacrifices, which I conceived it to be my duty to make, have been graciously accepted, or are likely to be followed with the smallest remuneration.

force my teeth through them, to swallow them was absolutely impossible. "They are the cheeses," said he, "of my native country; and my fondness for them is a taste which I acquired in my infancy. I was accustomed, when a child, to feed with the peasants on their coarse milk beverages. When I am travelling, and have gotten to a distance from great towns, on entering a village, I send on my servants and carriages before, and then my chief delight is to go unattended, and carefully muffled up in my cloak, into the house of the first peasant on the road, and feast on an earthen pot of curdled milk, with pieces of brown bread soaked in it. On my last journey into Livonia, on one of those occasions, I met with an adventure, which amused me extremely. While I was breakfasting in this style, a man comes in, singing merrily, and carrying a parcel on his shoulder. He sat down by me, and desired the host to give him a breakfast such as mine. I asked this traveller so gay, whence he came, and whither he was going.—I am a sailor, says he, and just arrived from a voyage to India. I disembarked at Riga, and am now on my return to Herland, which is my native country, where I have not been these three years, and where I shall stay till I have spent these hundred crowns: pulling out a leathern bag, and chinking the money.—I asked him several questions about the countries he had seen, which he answered very pertinently. But, said I to him, what, my friend, will you do, when your hundred crowns are spent?—Oh! says he, I will return to Holland, embark again for India, earn another bag of crowns, and come back and enjoy myself in dear Herland, in Franconia, my native country, once more.—The good humour and thoughtlessness of this being diverted me exceedingly," continued the grand master; "and to confess the truth, I envied his lot."

Provident nature, in giving so much force to the habits of infancy, intended that our happiness should depend on those who are most concerned in promoting it, that is, our parents; for on the affections with which they inspire us, at that period, depends the affection which we are one day to be called upon to return. But, with us, as soon as the child is born, he is delivered over to a mercenary nurse. The first bond which nature intended should attach him to his parents, is burst asunder before it is formed. By and by, perhaps, he will behold the funeral procession of these parents, proceeding from his father's house, with as much indifference as they beheld his cradle carried out of it. He is recalled home, it is true, at the age when the graces, when innocence, when the opening affections which ask to be cherished, should fix him there for ever. But he is permitted to taste these sweets, only to make him feel, in a little while, the bitterness of having them taken away from him. He is sent to school; he is put to board at a distance from home, where the tears he is doomed to shed, will have no maternal hand to wipe them away; where he will form friendships with strangers, pregnant with regret and repentance; and where the natural affections of brother, sister, father, mother, which are the most powerful, and the sweetest chains by which nature attaches us to our country, will be utterly extinguished.

After this first outrage committed on his young heart, others, equally violent, are offered to his understanding. His tender memory must be loaded with ablatives, conjunctions, and conjugations. The opening blossom of human life is sacrificed to the metaphysical jargon of a dead language. What Frenchman could submit to the torture of learning his own in that manner? And if there be men who have exercised such laborious patience, do they speak it better than persons who have never submitted to such drudgery? Who writes best, a lady of the court, or a

pedantic grammarian? Montagne, so replete with the ancient beauties of the Latin tongue, and who has given so much energy to our own, congratulates himself on "having never understood what the word *vocative* meant." To learn to speak by rules of grammar, is the same thing as learning to walk by the laws of equilibrium. It is practice that teaches the grammar of a language, and our best instructors in its rhetoric are the passions. It is only at the age and in situations where the passions develop themselves, that the beauties of Virgil and Horace can be felt: a circumstance which our most celebrated college translators never dreamt of. I recollect, that when at school I was for a long time stunned, as other boys are, by a chaos of barbarous terms, and that, when I happened to catch a glimpse, in the author I was studying, of any stroke of genius, which communicated itself to my reason, or any sentiment which made its way to my heart, I kissed the book for joy. To find that the ancients had common sense actually filled me with astonishment. I imagined that the difference between their reason and mine must be as great as was the difference in the construction of our two languages. I have known several of my school-fellows so disgusted with Latin authors, in consequence of those college explanations, that long after they had bidden adieu to the seminary, they could not bear to hear even their names mentioned. But when their minds began to be formed by an intercourse with the world, and by the operation of the passions, they became sensible of their beauties, and resorted to them as to the most delightful society. Thus it is that we stupify our children, and by unnatural constraint, convert a period of life which is all fire and activity, into a state, moping, sedentary, and speculative, which influences the temperament, and ingrafts upon it maladies without number. All this, however, amounts merely to the production of languor, and generates only

physical evils. But we train them also to vice ; under the guise of emulation we instill into them all the destructive seeds of ambition.

Of the two passions which are the moving principles of the human heart, love and ambition, the latter is by far the most durable, and the most dangerous. It is the last that dies in the old, and, by our mode of education, the first that germinates in the young. How much better would it be, to direct their early affections to some object worthy of being loved ? They are in general all destined, one time or other, to feel the power of this gentle passion. Nature, beside, has made it the firmest cement of society. If their age, or rather, if our financial concerns interfere with a commerce of this kind, their affections might be directed into the channel of friendship, and thereby, as Plato proposed in his republic, and Pelopidas effected at Thebes, battalions of friends be formed, prepared, at all seasons, to devote themselves to the service of their country.* But ambition never developes itself but at the expence of another. Whatever specious name it may assume,

* *Divide et impera*,—*divide and govern*, is a saying, of which, I believe, Machiavel was the author. Judge of the excellence of this maxim, from the miserable state of the country which gave birth to it, and where it has been reduced into practice.

The children of Sparta were taught only to obey, to love virtue and their country, and to live in the most intimate union, till the period when they were divided, in their schools, into two classes, lovers and beloved. With the other nations of Greece, education was arbitrary ; it consisted of a great variety of exercises, of eloquence, of wrestling, of running, and of pythian, olympic, and istician prizes. Such frivolities fostered partialities. Lacedemon gave law to them all : and while these nations going to the battles of their country, required the stimulus of pay, of harangues, of trumpets, of clarions, to excite their courage, it was necessary, on the contrary, to repress the ardor of the Lacedemonians, who went into the field, stimulated by no mercenary considerations, by no eloquent incitements, to the sound of the flute, and singing, in one grand concert, the hymn of the twin brothers, Castor and Pollux.

it is always the sworn enemy of virtue. It is the source too of the most dangerous vices, of jealousy, hatred, intolerance, and cruelty; for each votary seeks to gratify it in his own way. By nature and religion it is forbidden universally, and to the majority of subjects by the forms of their government. In our colleges a youth is brought up to empire, who will be doomed all his life to sell pepper. Seven years, at least, are employed there, in teaching our young men, who are the hope of the nation, to be the first in the art of declaiming, versifying, and prattling. For one who succeeds in these trivial pursuits, how many thousands lose, at once, their health and their Latin?

But it is emulation, we are told, that awakens talents. It would be easy, however, to prove, that the most celebrated writers, in every department of literature, were never educated at a college, from Homer, who knew no language but his own, to J. J. Rousseau, who was certainly no great latinist. How many young men have made a brilliant figure in the routine of the *l'es* at school, who are totally eclipsed in the vast province of letters? Italy is crowded with colleges and academies; but can it boast, at present, of a single writer of eminence? On the contrary, do we not see, in that country, that talents, distracted by ill-assorted societies, by jealousies, by cabals, by intrigues, and by all the restlessness of ambition, are become feeble and enervated, and are gradually wasting away? To me there appears also to be another cause for this decline; which is, that in those seminaries nothing is studied but the methods and forms of learning, or what, in the painter's phrase, is called *manner*. This practice, by fixing us in the track of a master, forces us out of the path of nature, which is the source of all talents. Look to France, and observe what are the arts brought there to the highest perfection; and you will find, that they are those for which there is no public school, no prize, and no academy: such

as milliners, jewellers, hair-dressers, cooks, &c. We have men, it is true, of high reputation, both in the liberal arts and in the sciences ; but these men had acquired their talents before they were admitted into academies. Beside, can it be said, that they are equal to those of preceding ages, which made their appearance long before academies existed? After all, admitting that schools and colleges might be favourable to talents, they would not, on that account, be the less prejudicial to the nation ; for it imports a country to have virtue rather than talents, and men who are happy, than men renowned. A treacherous glare covers the vices of those who succeed in our colleges ; while in the multitude who never succeed, secret jealousies, malicious whispers, mean flatteries, and all the vices of a negative ambition, are already in a state of fermentation, and ready, at the command of their leader, to burst forth upon the world.

While depravity is thus taking possession of the hearts of children, their reason is at the same time perverted. These abuses always walk hand in hand. First, they are taught to make false consequences. The tutor tells them, that Jupiter, Mercury, and Apollo are gods ; the priest of the parish, that they are demons : the one assures them, that Virgil, who has so ably vindicated the doctrine of a providence, is at least in the Elysian Fields, and that he enjoys in this world the esteem of all good men ; the other, that this same Virgil was a Pagan, and must certainly be damned. The gospel, too, speaks one language, and the seminary another : this tells them to be the last ; the college to be the first : virtue exhorts them to descend ; education bids them rise. And what renders it the more singular, is, that these contradictions, especially in the country, often proceed from the same mouth, the same ecclesiastic teaching the classics in the morning, and the catechism at night. I know how these matters are arranged

in the head of the tutor; but for the poor pupil, who is not paid for comprehending, as the other is for retailing them, all his ideas, of necessity, must be confounded and perplexed.

When subjects of terror are resorted to, where nothing ought to be administered but consolation; when, at the age of innocence, the woes, for example, denounced by Christ against the Pharisees, the doctors, and the other tyrants of the Jewish nation, are applied to them, or when their tender organs are shocked by certain monstrous images, so common in our churches, the case is still worse. I knew a young man, who, in his infancy, was so terrified at the dragon of St. Marguerite, with which his preceptor had threatened him in the village church, that he actually fell sick with terror, believing that he saw the monster constantly at his pillow, ready to devour him. To quiet his disturbed imagination, his father was under the necessity of appearing, sword in hand, to attack the dragon, and of pretending that he had killed him. Thus, agreeably to our practice, one error was driven out by another. When grown up, the first use he made of his reason was to reflect that the persons intrusted with the formation of it had twice imposed upon him.

After having elevated a poor boy above his equals, by the title of emperor, and even above the whole human race, by that of son of the church, he is brought low by cruel and degrading punishments. "Among other things," says Montagne,* "this part of the police of our schools has always disgusted me. They ought to have adopted, at all hazards, and certainly it would have been less disadvantageous, the extreme of indulgence. Our schools are gaols, and the youth immured in them so many captives. By punishing a child before he is debauched, we are sure to debauch

* *Essays*, book i. chap. 25.

“ him. If you pass when the lesson is delivering, you hear
“ a confused clamour from the children, on the one hand,
“ undergoing chastisement, and the masters, on the other,
“ intoxicated with rage. How strange a method, to awaken,
“ in those tender and timid spirits, a love of learning, by
“ surly looks, and denunciations of the birch! Pernicious
“ and unjust proceeding! Add to this, what Quintilian has
“ remarked, that this imperious authority is pregnant with
“ the most dangerous consequences, particularly from the
“ mode of chastisement. How much more decent an appearance
“ would their classes exhibit, strewed with flowers
“ and verdant boughs, than with the fragments of bloody
“ rods? I would have portrayed in them joy, gaiety,
“ Flora, and the Graces, as the philosopher Speusippus had
“ in his school: for where should their improvement be
“ looked for, but where their pleasure is?”*

I have seen, at school, children ready to swoon with pain, receive on their little hands a dozen severe strokes of a ferula. I have seen, by the infliction of this punishment, the skin separated from the tip of their fingers, and the bare flesh exposed. What shall be said of those other punishments, so infamous in their nature, and which influence the morals of both scholars and masters, as, from a thousand examples, might easily be proved? It is impossible to enter into detail upon this subject, without putting modesty to the blush. And yet they are employed by priests. They are defended by a passage from Solomon: “ He that spareth
“ the rod hateth the child.” But who can tell me, that

* Michael Montagne is likewise one of those men who were never at college, or, at least, the time of his continuance there was extremely short. He was educated, without tasting corporal punishment, and without the goad of emulation, under the roof of the gentlest of fathers, and by preceptors, whose memory he has preciousy embalmed in his writings; and he became, by means of an education diametrically the opposite of ours, one of the best and most enlightened men of the nation.

the Jews practised this punishment as we do? The Turks, who have retained a great part of their usages, regard it with abhorrence. The custom has been diffused over Europe only by the corruption of the Greeks of the lower empire, where it was introduced by the monks. If the Jews actually employed it, who knows but their ferocity may have proceeded from this part of their education? Beside, there are in the Old Testament many advices never intended for us. We find in it passages of difficult interpretation, dangerous examples, and impracticable laws. In Leviticus the use of swine's flesh is prohibited. To violate the sabbath, by working upon it, is a crime worthy of death; and to kill an ox without the camp, is forbidden under a similar punishment. St. Paul tells the Galatians, in so many words, that the law of Moses is a law of servitude; and he compares it to the slave Hagar, whom Abraham repudiated. Whatever respect may be due to the writings of Solomon, and to the laws of Moses, we are not their disciples, but the disciples of him, who said, "suffer little children to come unto me, and forbid them not;" who blessed them, and added, that, to enter into the kingdom of heaven, it is necessary to become like them.

Our children, subverted by the vices of our institutions, become sophists, knaves, hypocrites, envious, disgusting, and wicked. In proportion as they increase in age, they increase also in malignity and contradiction. There is not a single youth from our schools who knows any thing of the laws of his country; though there are some who may have heard speak of those of the twelve tables. There is not one who can tell how our own wars are conducted; though many can amuse you with anecdotes taken from those of the Greeks and Romans. There is not one who is ignorant that single combat is prohibited; and yet they flock, in general, to the fencing schools, where the only thing taught is to fight duels. They are sent thither, we are

told, merely to learn a graceful carriage, and to walk like gentlemen ; as if a gentleman must walk in the positions of *of tierce* and *quarte*, and as if the gait and attitude of a citizen ought to be that of a gladiator. Others, destined to functions more peaceful, are put to school to learn the art of disputation. Truth, they tell us, is sure to be struck out by the collision of opinions. This is a phrase, I presume, of one of our wits. For myself, if I met with her in the heat of a dispute, I should be wholly unable to recognize her. I should suspect that I was dazzled by my own passion, or else by that of my adversary. From disputes come sophisms, paradoxes, errors of every kind. Truth never shews her face before tyrants ; and every man who disputes is seeking to tyrannise. The light of this divinity has no resemblance to the fatal coruscations of the thunder, occasioned by the clashing of the elements, but is like the brightness of the sun, which is then only pure when the heavens are serene and divested of every cloud.

I shall not follow our youth into the world, where the greatest merit of antiquity can be of no service to them. What indeed would its grand republican sentiments avail them under a despotism, and its spirit of disinterestedness in a country where every thing is put up to sale ? What use could they make even of the impassible philosophy of a Diogenes, in cities where beggars are apprehended by the police, and sent to the house of correction ? Supposing them to have preserved only that fear of blame, and that desire of praise, under which their studies were conducted, they would then be sufficiently unhappy. Influenced from first to last by the opinions of another, and having themselves no steady principle, the silliest of women will rule over them with more unbounded empire than did their professors. But why dwell upon this subject ? Say what you will, our colleges will always be crowded. All I plead for is, that children should be delivered, at least, from that

tedious apprenticeship to misery, by which they are depraved at the happiest and most amiable period of their existence, and which has afterwards so much influence on their characters. Man is born good. It is society that renders him wicked; and it is our mode of education that prepares the way for it.

As my own testimony is not sufficient to bear me out in an assertion of so much importance, I shall produce others which are not liable to suspicion, and which I shall extract at random from the writings of ecclesiastics, not from any conformity they bear to their opinions, which are dictated by their condition, but because they are the result of their experience, which, in this respect, absolutely deranges their whole theory.

The first shall be from Father Claude d'Abbeville, a capuchin missionary, on the subject of the children of the inhabitants of the island of Maragnan, on the coast of Brazil, where, formerly, we laid the foundations of a colony, but whose fate has been similar to that of so many others, which have been lost by our instability and our divisions, the usual and natural effect of our injudicious education. "I know not," says he, "whether it be from the singular affection which, in this island, fathers and mothers bear to their children, but certain it is, they never say a word which can give them the slightest uneasiness; they are left at perfect liberty to do just what they please, and to take their own way in every case, without any apprehension of reproof. Accordingly the children here exhibit a most admirable appearance, and which has often excited the astonishment of foreigners, (and that with good reason), for they are seen seldom or never practising any thing that can displease their parents; but are at pains, on the contrary, to do every thing which they know, or imagine, will be agreeable to them:"* and he concludes

* History of the mission of capuchin fathers to the island of Maragnan, ch. xlvii.

with drawing a very favourable portrait of their physical and moral qualities. This testimony is confirmed by John de Lery, who speaks in similar terms of the Brasilians, a people whose manners are the same, and who dwell in the neighbourhood of that island.

My next authority shall be that of Anthony Biet, superior of the missionary priests, who, in the year 1652, went over to Cayenne, another colony lost to us from the same causes, and since indifferently settled. He is speaking of the children of the Galibis Savages.† “The mother takes great delight in nursing her child. There is no such thing known among them as giving their children to be suckled by a stranger. They are so fond of their infants as to bestow upon them the most extravagant endearments. Regularly every day they bathe them in a fountain or river. They do not swaddle them, but put them to sleep in a little cotton bed, made for the purpose. They leave them always naked, and their progress in growth, in consequence of this practice, is so wonderful, that some are able to go alone at the early period of nine or ten months. When arrived to a certain age, if they are incapable of walking erect, they creep along the ground on their hands and feet. These people never chide, never beat their children, but permit them to enjoy the most perfect liberty, which they never abuse by doing any thing to torment their parents. When they see any of our people correcting their children, it is a subject with them of the utmost astonishment.”

My third extract is from the work of a Jesuit, Father Charlevoix, a man of great and multifarious learning. It is to be found in his voyage to New Orleans; a farther colony which we have suffered to fall to decay through our divisions, the consequence of our moral constitution and our system of education. He is speaking in general of the savages of

† Voyage to the Equinoctial Countries, book iii. page 390.

North America. " To correct the faults of their children, they resort sometimes to prayers and tears, but never to threatenings. A mother, who sees her daughter conduct herself improperly, falls a crying. The daughter naturally enquires into the cause of her tears; and the mother contents herself with replying, child, you dishonour me. This reproof seldom fails to produce its effect. Since, however, a greater intercourse has taken place between these people and the French, some of them begin to chastise their children; but they are only those who have become christians, or who are fixed in the colony. The severest punishment usually inflicted by the savages, in correcting their children, is to throw a sprinkling of water in their face. Young women have been known to hang themselves, for having received from a mother some slight reprimand, or a few drops of water thrown in this manner in the face, and have previously given notice of their intention in these words—you shall no longer have a disobedient daughter."*

It is curious to observe the embarrassments under which this author continually labours, in attempting to reconcile his European prejudices with his remarks as a traveller; which produces in the course of his work a fund of contradictions. " It would seem," says he, " that a child-hood so badly disciplined, must be succeeded by a youth turbulent and corrupt." He admits that reason influences those people earlier than other men; but he ascribes the cause of it to their temperament, which, as he pretends, is more tranquil. He does not recollect the pathetic representations which he has himself exhibited of the scenes resulting from their passions, when they exalt themselves in the bosom of peace, in their national assemblies, where their harangues, as to justness of thought and sublimity of

* Historical Account of North America, letter 23, August 1721.

imagery, leave all the art of our orators at an infinite distance, or those other scenes amidst the fury of war, where they brave, in the face of flames, all the wrath of their enemies. He does not recollect that it is our European education which destroys our temper; for he acknowledges, in another place, that these same savages, brought up in our European manners, become more wicked than others. There are passages in his work, in which he depicts their morality, their amiable qualities, their happy life, in terms of the most affecting commendation; and sometimes he seems to envy their condition. I have not time to extract these passages, which may be read, indeed, in the book itself, to which I have referred, nor to produce a multitude of other testimonies, respecting the different nations of Asia, where the mildness of education has a perceptible influence on the physical and moral beauty of mankind, and forms, in every political constitution, the most powerful bond of union between the different members of the state.

I shall terminate these foreign authorities with a trait, that, from the pen of Rousseau, would never have passed with impunity, and which is extracted, word for word, from the work of a Dominican; I mean the charming history of the Antilles, by Father du Tertre, a man of abundant taste, good sense and humanity. It relates to the Caribs, whose education resembles that of the nations I have been describing.* "On mentioning the word savage," says he, "most people will figure to themselves a species of men, barbarous, cruel, inhuman, destitute of reason, deformed, tall as giants, hairy as bears; in a word monsters rather than rational beings. Whereas the men I am speaking of are savages only in name, just as the plants and fruits, which nature produces without culture in forests and deserts, are denominated wild or savage, though they

* Natural History of the Antilles, vol. ii. treatise vii. chap. 1, sect 1.

“ possess all their virtues and properties in their native
“ force and vigour, which we frequently corrupt by art,
“ and cause to degenerate, by transplanting them into our
“ gardens.” He afterwards adds, “ It is of importance to
“ observe here, that the savages in these islands are the
“ most contented, the most happy, the most sociable, the
“ *least vicious*, the least deformed, and the least tormented
“ by disease of any people in the world.”

If we trace among ourselves the history of a villain, we shall find that his infancy was always miserable. Wherever I have found children unhappy, I have observed they were uniformly wicked and ugly; and wherever I saw them happy, they were beautiful and good. In Holland and Flanders, where they are treated with the utmost gentleness, their beauty is singularly remarkable. It is from them that the famous sculptor, the Flemish Francis, borrowed his charming models of children; and Rubens that freshness of colouring which glows on those of his pictures. You never hear them, as with us, uttering loud and bitter cries, and still less threatened with the rod by their mothers and nurses. They are not gay, indeed, but they are contented. You observe on their countenance an air of tranquillity and beatitude, which is more captivating to the eye, and more interesting to the heart, than the boisterous mirth of our young people when they are no longer under the eye of their fathers or preceptors. This serenity is diffused over all their actions, and is the source of a happy composure which characterizes their future life. I have myself never seen a country where parental tenderness was carried so far. The children, in their turn, repay these parents, in their old age, the indulgence with which they are treated in helpless infancy. It is by bonds thus endearing that these people become so attached to their country, and that few of them are found settling among strangers. With us, on the contrary, fathers like to see their children vivacious

and witty rather than good, because in a constitution of ambitious society, these qualities raise a man to the head of a party, while virtue and goodness become its dupes. We have collections of epigrams composed by children. Wit, however, being merely the perception of the relations of society, children can hardly be supposed to have any but what is borrowed. In them, indeed, it is often the proof of a miserable existence, as may be remarked in the school-boys of our cities, who are usually sprightlier than the children of the peasantry, and in those who labour under some natural defect, as lameness, or other deformity, who are observed, as to wit, to be still more premature than the others. But, in general, they are all forward in point of feeling; and it is this circumstance which reflects so much blame on those who degrade them, at an age when they frequently feel more delicately than men. Of this maturity of feeling I shall cite some instances, calculated to prove that, in spite of the defects of our political constitutions, there still exist in certain families good natural qualities, or well improved virtues, which leave to the happy affections of children the liberty of expanding.

In the year 1765 I was at Dresden, and happened to go to the court theatre. The piece performed was *The Father*, (*Pere de Famille*) by Diderot. The electress came in with one of her daughters, about five or six years of age. An officer of the Saxon guards, who had accompanied me, said, in a whisper, "That child will interest you as much as the play." In fact, she had no sooner taken her seat, than, resting both hands on the front of the box, she fixed her eyes on the stage, and remained, with open mouth, immoveably attentive to the performers. It was a sight truly affecting. Her face reflected, as in a mirror, all the different passions which the drama was intended to excite. You could see depicted upon it, in succession, anxiety, surprise, melancholy, sorrow. As the interest increased, from

scene to scene, the tears began copiously to trickle down her infantine cheeks, accompanied with shivering, sighing, sobbing, till it became necessary at length to carry her out of the box, for fear of her being stifled. My companion informed me, that, as often as this young princess attended at the theatre, she was obliged, in like manner, if the piece was pathetic, to retire before it was concluded.

I have witnessed instances of sensibility, in the children of the common people, still more affecting, because they were not occasioned by any theatrical effect. As I was walking, some years ago, through the *Pré St. Gervais*, about the setting-in of winter, I observed a poor woman, prostrate upon the ground, employed in weeding a bed of sorrel, and by her side a little girl, at most not more than six years of age, standing motionless, and absolutely impurpled with the cold. I addressed myself to the woman, who betrayed evident symptoms of indisposition, and enquired into the nature of her malady. "Sir," said she to me, "for three months past, I have suffered very severely from the rheumatism; but the pains of my disorder are nothing compared with what I suffer for this poor child, who will not quit me a single moment. If I say to her, See, my love, you are quite benumbed with cold, go within doors and warm yourself; she replies, Alas! my dear mother, if I leave you, your complaints will be your only companion."

At another time being at Marley, I went into its magnificent park, and amused myself, in the woods, with looking at the charming groups of children, who are represented feeding, with vine leaves and grapes, a she goat, which is at play with them. At no great distance is an inclosed pavilion, where Louis XV. sometimes resorted in fine weather to enjoy a collation. Being caught in a sudden shower, I retired for a few moments into this pavilion to shelter myself, and I found there three children, two girls and

a boy, who interested my affections much more warmly than had the children in marble without. The girls were uncommonly handsome, and were employed, with singular activity, in picking up, round the arbour, the scattered sticks of dry wood, which they deposited in a basket that stood on the king's table, while the boy, all in tatters, and extremely meagre, was devouring a morsel of bread in a corner. I asked the tallest of the girls, who might be about eight or nine years old, what she intended to do with that wood, which she was so busily collecting. She replied, "Look, Sir, at that poor boy; he is very miserable! he has the misfortune to have a step-mother, who sends him out, all day long, to pick up wood: if he carry none home, he is severely beaten; when he happens to have collected a little, and is carrying it off, the Swifts, at the park gate, takes it to his own use. He is half dead with hunger, and we have given him our breakfast." Having said this, she and her companion filled the little basket, helped him up with it on his back; and hastened on before to the gate of the park, to see if their unhappy friend could pass unmolested.

Absurd and unfeeling instructors! Human nature, you tell us, is corrupted: yes, and it is you, by the contradictions, the unprofitable studies, the dangerous ambition, which you inculcate, and by your shameful chastisement, who are the corruptors. But, by an equitable re-action of divine justice, this feeble and unfortunate generation will one day render back to the generation which oppresses it, in jealousies, in disputes, in apathies, in oppositions of tastes, of modes, and of opinions, all the injuries which it has received.

Such are the causes and the re-actions of our evils. I have explained them, in the best manner I am able, in the view of vindicating nature from the charge of having produced them; and I purpose, at the close of this work, to

exhibit the palliatives and the remedies. These speculations, no doubt, will be vain and inefficient : but if some minister shall have the courage, one day, to undertake to render our country happy within itself, and powerful among the nations, I will venture to predict, that this will be effected neither by plans of economy, nor by political alliances ; but by reforming its manners and its plan of education. This revolution is not to be accomplished by means of punishments and rewards, but by imitating the processes of nature, who never acts but by re-actions. It is not to the apparent evil that the remedy must be applied, but to the cause. The cause of the moral power of gold, is in the venality of public offices ; that of the excessive super-abundance of indolent tradesmen in our cities, in the imposts which degrade the inhabitants of the country ; that of the beggary of the poor, in the overgrown property of the rich ; that of the prostitution of young women, in the celibacy of the men ; that of the prejudices of the nobility, in the resentments of the vulgar ; and that of all the evils of society, in the torments inflicted upon children.

For myself, I have delivered my sentiments without disguise, and if I could have addressed the nation in one vast assembly, and from some point of the horizon where Paris was discernible, I would have directed its attention, on the one hand, to the monuments of the rich, to the thousands of voluptuous palaces visible in the suburbs of our city, to its eleven theatres, to the steeples of a hundred and thirty-four convents, among which arise eleven wealthy abbeys, to those of a hundred and sixty other churches, twenty of which are richly endowed chapters ; and, on the other, would have pointed to the monuments of the wretched, to our fifty-seven colleges, sixteen courts of justice, fourteen barracks, thirty guard houses, twenty-six hospitals, twelve prisons or houses of correction. I would next have displayed the magnificence of the gardens, courts, greens, inclosures, and

dependencies, of all our vast edifices, accumulated on a space of ground less than a league and a half in diameter; and I would have demanded, whether the rest of the kingdom was distributed in the same proportion as the capital. I would have asked, where are the properties of those who supply it with food, raiment, habitation, and the means of defence; and what is left at last for the lower order of citizens, for fathers of families, and the multitude at large, to render them contented and happy? Having shewn the causes and the effects of our evils, I would then, oh, ye moral and political powers! I would then have prostrated myself at your feet, and would have expected, as the reward of truth, the same recompence which the peasant of the Danube expected from the insatiable powers of Rome.*

* To the Study we have just concluded, Study xii. upon education, may be considered as a sequel.

STUDY VIII.

ANSWER TO THE OBJECTIONS AGAINST PROVIDENCE,
AND THE HOPES OF A LIFE TO COME, FOUNDED ON
THE INCOMPREHENSIBLE NATURE OF GOD, AND THE
MISERIES OF THIS LIFE.

“ BUT what consolation is it,” some one will say,
“ that my tyrants are punished, if I am still to be the
“ victim of tyranny? Is it possible that compensations
“ like these should be the work of God? Beside, great
“ philosophers, who have devoted their whole life to the
“ study of nature, have never been able to find out its
“ author. Who hath seen this God? What is it that
“ constitutes, or who has made him? But granting that an
“ intelligent being directs the affairs of the universe, man,
“ assuredly, is abandoned to himself. No hand has traced
“ his career; and to me it appears as if he had two Gods,
“ one inviting him to unbounded enjoyment, and the other
“ dooming him to endless privation, a God of nature, and a
“ God of religion. He knows not which of the two he is
“ to please, and whatever be his choice, he is ignorant
“ whether the object of it be deserving of his love or his
“ hatred. His virtue itself fills him with doubts and
“ scruples. It renders him miserable both within and
“ without. It reduces him to a state of perpetual warfare
“ with himself, and with the world, to the interests of
“ which he is obliged continually to sacrifice himself. If
“ he be chaste, the world says, it is because he is passion-

“ less and impotent; if religious, because he is weak; if
“ benevolent to those around him, because he wants
“ courage; if he devote himself for the good of his country,
“ he is a fanatic; if he be simple and guileless of heart, he
“ is duped; if modest, he is supplanted: he is every where
“ derided, betrayed, despised, now by the philosopher, and
“ now by the devotee. On what foundation can he build
“ the hope of a recompense for so many struggles and
“ mortifications? On a life to come, will you say? But
“ what assurance has he of its existence? Where is the
“ traveller that ever turned from thence? The soul of man
“ too, what is it? Where was it a hundred years ago;
“ and where will it be a hundred years hence? It develops
“ itself with the senses, and expires when they expire.
“ What becomes of it in sleep, in a lethargy? It is the
“ illusion of his pride that persuades him it is immortal.
“ Nature points every where to death, in his monuments,
“ in his appetites, in his loves, in his friendships: man is
“ every where obliged to draw a veil over this idea. To
“ live less miserable, it is necessary he should *divert himself*,
“ that is, as the word literally implies, he ought to *turn*
“ *aside* from that dreary perspective of evils which nature
“ is continually presenting to him. To what labours has
“ she not subjected his miserable life? The beasts of the
“ field are a thousand times happier; clothed, lodged, fed,
“ by the hand of nature, they give themselves up, without
“ solicitude, to the indulgence of their passions, and finish
“ their career without presentiment of death, and without
“ dread of the consequences that are to follow. If a God
“ actually preside over the destiny of all, it is a God
“ inimical to the race of man. What is it to me that the
“ earth is clothed with vegetables, if I have not the shade
“ of a single tree at my disposal? Of what importance to
“ me are the laws of harmony and of love, which govern
“ nature, if I behold around me objects only that are faith-

" less and deceiving ; or if my fortune, my condition, my
 " religion, impose celibacy upon me. The general felicity
 " diffused over the earth, serves only as a bitter aggravation
 " of my individual wretchedness. What interest can I
 " take in the wisdom of an arrangement which renovates
 " all things, when, as a consequence of that arrangement,
 " I feel myself sinking, and ready to be lost for ever? A
 " single wretched being might justly arraign providence,
 " and say with Job, the Arabian : * ' wherefore is light
 " given to him that is in misery ; and life unto the bitter in
 " soul?' Alas ! the appearances of happiness have been
 " disclosed to the view of man, only to overwhelm him
 " with despair of attaining it. If a God, intelligent and
 " good have the guidance and government of nature, the
 " affairs of the children of men are at least in the hands of
 " diabolical spirits, whose pleasure it is to confound and
 " overthrow them."

I shall, first, reply to the principal authorities by which
 some of these objections are supported. They are derived,
 in part, from a celebrated poet, and a learned philosopher,
 namely, Lucretius and Pliny.

Lucretius has clothed the philosophy of Empedocles and
 Epicurus in the most harmonious verses. His imagery too
 is enchanting. But that philosophy of atoms, which adhere
 to each other by chance, is so completely absurd, that, where-
 ever it appears, the beauty of the poetry is degraded by it.
 For the truth of this I refer to the judgment of his partisans
 themselves. It speaks neither to the heart nor to the
 understanding. It offends equally in its principles, and in
 the consequences deduced from them. " To what," we
 may ask him, " did those primary atoms, out of which you
 " construct the elements of nature, owe their existence?
 " Who communicated to them the first movement? How

* Job, chap. iii. ver. 20.

“ was it possible they should have given to the mere aggregation of a great number of bodies, a spirit of life, a sensibility, and a will, which they themselves did not possess? If you believe, with Leibnitz, that these monades or unities, have, in reality, perceptions peculiar to themselves, you give up the laws of chance, and are reduced to the necessity of allowing to the elements of nature, the intelligence which you refuse to its author.” Descartes has, in truth, subjected those impalpable principles, that metaphysical dust, if I may so express myself, to the laws of an ingenious geometry; and, after him, the herd of philosophers, seduced by the facility of fabricating all sorts of systems with the same materials, have applied to them, by turns, the laws of attraction, of fermentation, of crystallization, in a word, all the operations of chemistry, and all the subtilities of dialectics; but the attempts of one of these philosophers have been no more successful than those of another, but have all alike been futile and inefficient. In the article immediately subsequent to the present study, we shall demonstrate, when we come to speak of the weakness of human reason, that the method adopted in our schools, of ascending to first causes, is the perpetual source of the errors of our philosophy, in physics as well as in morals. Fundamental truths resemble the stars, and our reason may be said to be the graphometer. If this instrument, constructed for observing the heavenly bodies, become ever so slightly deranged; if, from the point of departure, we commit a mistake of the minutest angle, the error, at the extremity of the visual rays, is rendered thereby incommensurable. In the method which Lucretius adopted, there is something still more strange; which is, that, in a work, the professed object of which is to materialize the Deity, he sets out with deifying matter. In this proceeding he has himself been governed by an universal principle, which, when we come to adduce the

proofs of the divinity from feeling, we shall endeavour to unfold; and the principle is, that, powerfully to interest mankind, whatever be the object, without presenting to the mind some of the attributes of Deity, is found to be utterly impossible. Accordingly, before he attempts to dazzle the understanding as a philosopher, he begins with setting the heart on fire as a poet. The following is a part of his exordium:

— Hominum divûmque voluptas,
Alma Venus, cœli subter labentia signa
Quæ mare navigerum, quæ terras frugiferentes
Concelebras, per te quoniam genus omne animantûm
Concipitur, visitque exortum lumina solis,
Te dea, te fugiunt venti, te nubila cœli,
Adventuque tuo, tibi suaves dædala tellus
Submittit flores, tibi rident æquora ponti,
Placatumque nitet diffuso lumine cœlum.

.
Quæ quoniam rerum naturam sola gubernas,
Nec, sine te, quidquam dias in luminis oras
Exoritur, neque sit lætum, neque amabile quidquam,
Te sociam studeo scribendis versibus esse,
Quos ego de rerum naturâ pangere conor.

.
Quo magis æternum, da dictis, diva, leporem.
Effice ut interea fera munera militiæ
Per maria ac terras omnes sopita quiescant,
Nam tu sola potes tranquillâ pace juvare
Mortales, quoniam belli fera munera Mavors.
Armipotens regit, in gremium qui sæpe tuum se
Rejicit, æterno devictus vulnere amoris.

.
Hanc, tu diva, tuo recubantem corpore sancto
Circumfusa super, suaves ex ore loquelas
Funde, petens placidam Romanis, inclyta pacem:

Nam neque nos agere, hoc patriâ tempore iniquo,
 Possumus æquo animo.

De Rerum Naturâ, lib. i.

Delight of human kind, and gods above,
 Parent of Rome, propitious queen of love,
 Whose vital pow'r, air, earth, and sea supplies,
 And breeds whate'er is born beneath the rolling skies :
 For every kind, by thy prolific might,
 Springs, and beholds the regions of the light :
 Thee goddess, thee, the clouds and tempests fear,
 And at thy pleasing presence disappear :
 For thee the land in fragrant flowers is drest,
 For thee the ocean smiles, and smooths her wavy breast,
 And heaven itself with more serene and purer light is blest.

.....
 Since then the race of every living thing,
 Obeys thy power ; since nothing new can spring
 Without thy warmth, without thy influence bear,
 Or beautiful or lovely can appear,
 Be thou my aid : my tuneful song inspire,
 And kindle with thy own productive fire ;
 While all thy province, nature, I survey.—

.....
 Meantime on land and sea let barbarous discord cease,
 And lull the listening world in universal peace.
 To thee, mankind their soft repose must owe,
 For thou alone that blessing can'st bestow ;
 Because the brutal business of the war
 Is manag'd by thy dreadful servant's care :
 Who oft retires from fighting fields to prove
 The pleasing pains of thy eternal love.

.....
 When wishing all, he nothing can deny,
 Thy charms in that auspicious moment try ;
 With winning eloquence our peace implore,
 And quiet to the weary world restore.

DRYDEN.

In the sequel of his poem, Lucretius is, in reality, constrained to admit, that this goddess, so wonderfully beneficent, is directly chargeable with the ruin of health, of fortune, of talents, and, sooner or later, with the loss of reputation; that, in the very lap of the pleasures which she bestows, there is a certain something, which embitters enjoyment, torments the heart, and renders us miserable. The unfortunate bard himself fell a victim to this, for he died in the very prime of life, either, according to some, from excessive indulgence, or poisoned, as others assert, by an amorous potion administered by the hand of a woman. In the passage we have quoted, he ascribes to Venus the creation of the world; he addresses prayers to her; he bestows on her person the epithet of sacred; he invests her with a character of goodness, justice, intelligence, and power, which belongs to God only; in a word, the attributes he bestows are so exactly the same, that, suppressing only the word Venus, in the invocation of his poem, you may apply almost every clause of it to the divine wisdom. There are even points of resemblance so striking, between this representation of Lucretius and the picture given of Wisdom, in the book of Ecclesiasticus, that I cannot refrain from exhibiting the counterpart, that the reader may compare them together.

Vulgate Latin Version.

Cap. xxiv.

Ver. 3. 4. 5. Ego ex ore Altissimi prodivi, primogenita ante omnem creaturam; ego feci in cœlis ut oriretur lumen indificiens, et sicut nebula texi omnem terram. Ego in altissimis habi-

*Common English Version.**

3. I came out of the mouth of the Most High, *before any created being existed.* I appointed a light in the heavens *never to be extinguished*, and covered the earth with a cloud.

* The parts in italics in this version are from the version of St. Pierre.

tavi, et thronus meus in columnâ nubis.

4. I dwelt in high places, and my throne is in a cloudy pillar.

5. I alone compassed the circuit of heaven; and walked in the bottom of the deep.

6. 7. 8. 9. Gyrum cœli circuivi sola, et profundum abyssi penetra- vi, in fluctibus maris ambulavi; et in omni terrâ steti, et in omni populo; et in omni gente prima- tum habui. Et omnium excel- lentium et humilium corda vir- tute calcavi, et in his omnibus requiem quæsi, et in heredi- tate domini morabor.

6. In the waves of the sea, and in all the earth, and in every people and nation, I got a pos- session.

7. &c. *In the greatness of my might I have subdued the hearts of the humble and the proud. I have sought a resting-place in the midst of them: but I will fix my abode only in the inheritance of Jehovah.*

13. Quasi cedrus exaltata sum in Libano, et quasi cypressus in monte Sion.

13. I was exalted like a ce- dar in Libanus, and as a cypress tree upon the mountains of Her- mon.

14. Quasi palma exaltata sum in Cades, et quasi plantatio rosæ in Jericho. Quasi oliva speciosa in campis, et quasi platanus exaltata sum juxta aquam in pla- teis.

14. I was exalted like a palm tree in Engaddi, and as a rose plant in Jericho, as a fair olive tree in a pleasant field, and grew up as a plane tree by the water.

16. Ego quasi terebinthus ex- tendi ramos meos, et rami mei honoris et gratiæ.

16. As the turpentine tree I stretched out my branches, and my branches are the branches of honour and grace.

17. Ego quasi vitis fructificavi suavitatem odoris, et flores mei fructus honoris et honestatis.

17. As the vine brought I forth pleasant savour, and my flowers are the fruit of honour and riches.

18. Ego mater pulchræ dilec- tionis, et timoris, et agnitionis,

18. I am the mother of fair love, and fear, and knowledge,

et sanctæ spei. In me gratia
omnis viæ et veritatis, in me
omnis spes vitæ et virtutis.

19. Transite ad me, omnes
qui concupiscitis me, et genera-
tionibus meis implemini.

20. Spiritus enim meus super
mel dulee, et hæredites mea super
mel et favum.

and holy hope: *I am the way and
the truth, and in me dwelleth all
the expectation of life and virtue.*

19. Come unto me, all ye that
be desirous of me, and fill your-
selves with my fruits.

20. For my memorial is
sweeter than honey, and mine
inheritance than the honey-
comb.

This Latin prose version is a translation from the Greek, and the Greek again a translation from the Hebrew. Accordingly, in passing through so many hands, the graces of the original must necessarily have been tarnished. But, even as it is, it possesses, in its pleasant and sublime imagery, a decided superiority over the verses of Lucretius, who appears to have borrowed from it his principal beauties. But enough of this poet: the exordium of his performance is itself a sufficient refutation of his system.

Pliny takes a course directly the reverse. At the very threshold of his Natural History, he begins with affirming that there is no God; and the whole work is, in reality, an elaborate demonstration of the existence of a God. As the authority of this writer is not that of a poet, to whom opinions are a matter of indifference, provided a striking picture can be produced, nor that of a sectary, obstinately bent on supporting a party, whatever violence may be done to conscience, nor that of a parasite, making his court to vicious princes, it has always been held in great estimation. He wrote under the virtuous Titus, and has dedicated his book to him. His love of truth, and contempt of the glory of the age in which he lived, is carried so far as to condemn the victories of Cæsar, in Rome itself, and when addressing a Roman emperor. His heart glows with humanity and virtue. Sometimes he exposes to censure the cruelty of

masters to their slaves, the luxury of the great, and the dissolute conduct of certain emperors; and at others pronounces the panegyric of good men, and exalts even above the inventors of arts, those who have rendered themselves illustrious by their continency, their modesty, and their piety. His work, too, in other respects, is a combination of brilliancies. It is a real Encyclopedia, and contains, as it ought to do, the history both of the knowledge and the errors of his time. For the errors he has often been blamed, and has, very unjustly, been said to partake of them, for, in general, he brings them forward merely to refute them. He has been abused also by physicians and apothecaries, because he decries their conjectural art and their systematic spirit, and, meanwhile, they have extracted from him the greatest part of their prescriptions. He abounds beside, in curious information, in profound views, in interesting traditions; and, what renders his performance invaluable, he employs uniformly the language of the picturesque. With all this taste, judgment, and knowledge, Pliny, however, was an atheist. Nature, from whose capacious stores he has derived such various intelligence, may address him in the words of Cæsar to Brutus: what, you too, my son! are you my enemy?

I both love and esteem Pliny; and if I were permitted, in his justification, to deliver my sentiments of his immortal work, I would say, that, in the passage where he is made to reason as an atheist, some forgery has been committed upon him. All his commentators agree in opinion, that no author has suffered more from the unfaithfulness of transcribers, and this to such a degree, that copies of his *Natural History* exist, in which there are whole chapters entirely different. Consult, among others, what Mathiola says on the subject, in his *Commentaries on Dioscorides*. I shall observe here, that the writings of the ancients, in descending to us, have passed, in general, through more than one

unfaithful language, and, what is worse, through more than one suspicious hand. They have shared the fate of their monuments; for, as among these, their temples have been most degraded, so their books have been mutilated chiefly in those passages which are favourable to religion, or the reverse. We have an instance of this in the transcription of Cicero's *Treatise on the Nature of the Gods*, in which the objections against providence are omitted. Montagne upbraids the first christians with having, because of four or five articles which were unfavourable to their creed, suppressed a part of the works of Cornelius Tacitus, "though," says he, "the emperor Tacitus, his relation, had, by express edict, furnished all the libraries in the world with them."* In our own days, do we not see how eager every party is to degrade the reputation and opinions of the party which opposes it? Mankind, between religion and philosophy, is like the old man in the fable, between two mistresses of different ages. They were both desirous of trimming his locks, but each in her own way. The younger picked out all the white hairs, which were offensive to her; while the old one, for a similar reason, as carefully removed the black: the consequence was, that his poor head was speedily reduced to complete baldness. Nothing can demonstrate more completely this ancient spirit of party and unfair proceeding, than an interpolation to be found in the writings of Flavius Josephus, who was contemporary with Pliny. He is made to say, in so many words, that the Messiah was just born; and he continues his narration, without referring, so much as once, to this wonderful event, to the end of a voluminous history. How can it be supposed that Josephus, who frequently indulges himself in a tedious detail of minute circumstances, relating to events of little importance, if he had believed in Jesus Christ, should

* *Essays*, book ii. chap. xix.

not have reverted a thousand times to a birth so deeply interesting to his nation, considering too, that its very destiny was involved in that event, and that even the destruction of Jerusalem was only one of the consequences of the death of Christ? On the contrary, he perverts the meaning of the prophecies which announce him, by applying them to Vespasian and to Titus; for he expected, as well as the other Jews, a triumphant Mefsiah. Beside, had Josephus believed in Christ, would he not have embraced his religion? Arguing in the same manner, is it credible that Pliny should commence his Natural History with denying the existence of God, and afterwards fill every page of that history with expatiating on the wisdom, the goodness, the providence, the majesty of nature, on the presages and auguries sent expressly from the gods, and even on the miracles divinely operated through the medium of dreams?

Certain savage casts have likewise been adduced as instances of atheism, and every sequestered corner of the globe has for this purpose been explored. But obscure tribes were no more intended to serve as examples to the human race, than certain mean and obscure families, among ourselves, could be proposed as proper models to the nation; especially when the professed object is to support, by authority, an opinion which is necessarily subversive of all society. Beside, such assertions are absolutely false. I have read the history of the voyages from which they are extracted. The travellers acknowledge, that they had but a transient view of those people, and that they were totally unacquainted with their languages. They concluded, that there could be no religion among them, because they saw no temples; as if any other temple were necessary to a belief in God, than the temple of nature. These travellers also contradict themselves, for they relate elsewhere, that those very nations, whom they represent as totally devoid of religion, make obeisance, at its change and its full, to the moon, by pros-

trating themselves to the earth, or by lifting up their hands to heaven; that they honour the memory of their ancestors, and place viands on their tombs: and the immortality of the soul, in whatever form admitted, necessarily supposes the existence of God.

But if the first of all truths stood in need of the testimony of men, we could collect that of the whole human race, from geniuses the most exalted, to minds in the most abject state of ignorance. This unanimity of evidence is of irresistible weight; for as to universal error, it is impossible such a thing should exist.

Hear what the sage Socrates said to Euthydemus, who expressed a desire of obtaining complete assurance that the gods actually existed.*

“ When I declared the existence of the gods,” says he, “ and asserted, that the race of man is their peculiar care, be assured that I declared to you the truth. You must not, however, expect they should assume a visible appearance, and present themselves to your senses; but must satisfy yourself with contemplating and adoring them in their works; for it is in their works only they make themselves known to mankind. Of all the gods to whose liberality we are so much indebted, not one, in dispensing his favours ever renders himself visible; and the great God himself, by whom the universe was created, and who upholds this vast fabric, of which all the parts are so admirably and beneficently adjusted; he who watches over it with unwearied constancy, and takes care that it shall neither wax old nor decay, but always subsist in immortal vigour;† he too, who, with power

* Xenophon's Memorable Things of Socrates, book iv.

† Socrates had made nature his particular study; and, though his opinion as to the duration and preservation of her works may not square with that of our philosophers, who consider the globe of the earth, especially, as in a

“ uncontroulable, constrains every thing he has made to
 “ obey his will, and that with a promptitude which sur-
 “ passes our imagination : he, I say, in all those wonders
 “ of which he is the author, is abundantly visible : but if
 “ our eyes would penetrate to his throne, and would contem-
 “ plate the mighty operations of his hands in their source,
 “ he must there remain to us ever invisible. Consider,

progressive state of ruin, it is in perfect harmony with the holy scriptures, which give us the most positive assurances, that it is upheld by the hand of God, as well as with our own experience upon the subject, as I have already shewn. We have little reason to decry the physical knowledge of the ancients, except as far as it was reduced to system : and we ought to recollect, that by them most of the discoveries were made which the moderns boast of as all their own. The Tuscan philosophers understood the art of conjuring the thunder. The good king Numa made experiments on this subject. Tullus Hostilius would fain have imitated him, but fell a victim to his attempt, from not understanding how to conduct the experiments, (See Plutarch). Philolaus, the Pythagorean, asserted, long before Copernicus, that the sun was the center of the world ; and before Christopher Columbus, that the earth had two continents, that on which we are placed, and the continent opposite to it. Several philosophers of antiquity maintained, that comets were stars, which pursued a regular course. Pliny himself says, that they all move in a northerly direction, which is generally true. Meanwhile, it is not yet two hundred years since comets were believed in Europe to be vapours, which caught fire in the intermediate regions of the air. About the same period it was also generally believed, that the sea furnished a supply of water to the fountains and rivers, by a process of filtration through the pores of the earth, though it is said in a hundred passages of scripture, that their sources are kept flowing by the rains. Of this we are now convinced, by accurate observations on the evaporations of the ocean. The monuments which the ancients have transmitted to us in architecture, sculpture, poetry, tragedy, history, will ever serve as models to us. We are indebted to them likewise for the invention of almost all the other arts ; and it may be presumed, that these arts had the same superiority over ours, which their liberal arts have. As to the natural sciences, they have left us, it is true, no object of comparison ; but the priests, who were chiefly employed in their cultivation, carefully concealed the knowledge of them from the people. There is little room to doubt, however, that they possessed, on this subject also, a wisdom far above ours. See what the judicious Sir William Temple has said of the magic of the ancient Egyptians.

“ for a moment, that the sun, even, which seems purposely
“ exposed to the view of the whole creation, will yet not
“ permit a single individual steadily to behold him, and
“ whoever shall persist in so rash an attempt, is instantly
“ punished with blindness. All the other instruments of
“ the gods are in like manner invisible. The thunder is
“ darted from on high ; it dashes in pieces every thing it
“ meets ; but we do not see it fall, we do not see it strike,
“ we do not see it return. The winds are invisible, though
“ the ravages they commit are daily apparent, and we feel
“ their influence the moment they begin to blow. If there
“ be any thing in man that partakes of the divine nature,
“ it is his soul. It is the soul, no doubt, that directs and
“ governs him ; nevertheless it is impossible to see it.
“ Learn then from all this, not to despise things invisible ;
“ but acknowledge their powers in their effects, and honour
“ the Deity.”

Newton, who has penetrated so profoundly into the laws of nature, never pronounced the name of God, without taking off his hat, and expressing the most devout respect. He was fond of recalling this sublime idea, even in his moments of conviviality, and considered it as the natural bond of union among all nations. The Dutch painter, Corneille Le Bruyn, relates, that, happening one day to dine at his table, in company with several other foreigners, Newton, when the desert was served up, proposed a health to the men of every country who believed in God. This was drinking the health of the human race. Is it to be supposed, that so many nations, so different too in language and manners, and, in many cases, of so contracted an intelligence, would believe in God, if that belief were the result of some tradition, or of a profound metaphysical disquisition? On the contrary, it arises from the simple spectacle of nature. A poor Arabian of the desert, and ignorant as most of the Arabians are, was one day asked,

how he came to know there was a God? "In the same manner," replied he, "that I know, by the print impressed on the sand, whether it be a man or a beast which has passed that way."*

It is impossible for man, as we observed before, to invent a single form, or to produce a single idea, of which the model is not in nature. He unfolds and improves his reason, by means only of the reasons, of different kinds, which nature has supplied. God, therefore, must exist, were there no other argument to prove it than this, that man has an idea of him. But if we attentively consider, that every thing necessary to man exists in a most wonderful adaptation to his necessities, for the strongest of all reasons, God likewise must exist, who is the universal adaptation of all the societies of the human race.

But I would gladly know, in what way the persons who doubt of his existence, from a survey of the works of nature, would desire to be assured of it? Do they wish that he should appear under a human form, and assume the figure of an old man, as he is painted in our churches? They would then say, This is a man. And were he to invest himself with some unknown and celestial form, could we, in a human body, support the sight? The complete and full display of one only of his works on the earth, would be sufficient to confound our feeble organs. For example, if the earth turns round its axis, as is supposed, where is the human being, who, from a fixed point in the heavens, could view the rapidity of its motion without shuddering? for he would behold rivers, oceans, kingdoms, whirling about under his feet with a velocity almost three times as great as that of a cannon ball. And yet this swiftness of its diurnal rotation is in reality nothing; for the rapidity with which the globe describes its annual circle, and hurls us

* Travels in Arabia, by M. D'Arvieux.

round the sun, is seventy-five times as great as that of a cannon ball. If it were possible to view through the skin, the mechanism even of our own body, would not the sight be too much for our fortitude? When we saw the blood circulating, the nerves pulling, the lungs blowing, the humours filtrating, and all the incomprehensible assemblage of fibres, tubes, pumps, currents, pivots, which sustain an existence, at once so fragile and so ambitious, should we dare to make a single movement?

Would we wish, on the contrary, that God should manifest himself in a manner adapted to his nature, by the direct communication of his intelligence, without any intermediate veil between him and us? Alas! Archimedes, whose mind was capable of such intense application, as not to be disturbed from his train of thought by the sack of Syracuse, in which he lost his life, had nearly gone distracted, from the simple perception of a geometrical truth, of which he suddenly caught a glimpse. He was pondering, while in the bath, the means of discovering the quantity of alloy which a rascally goldsmith had mixed in Hiero's golden crown; and having discovered it, from the analogy of the different weight of his own body when in the water and out of it, he sprung from the bath, naked as he was, and ran like a madman through the streets of Syracuse, calling out, *I have found it! I have found it!* In like manner, when some striking truth, or some affecting sentiment, happens to lay hold of the audience at a theatre, you see some melted into tears, others almost choked with an oppressed respiration, others again in a perfect transport, clapping their hands and striking their feet, while the females in the boxes are actually fainting away. Were these violent emotions to go on progressively but for a few minutes longer, the persons subject to them might lose their reason, and perhaps their life. What then would it be, if the source of all truth, and of all feeling, were to communicate himself to us in a mortal body? God

has placed us at a suitable distance from his infinite majesty ; near enough to have a perception of its existence, but not so near as to be annihilated by it. He veils his intelligence from us under the forms of matter, and he inspires us with confidence as to the movements of matter by the sentiment of his intelligence. If he be pleased at any time to communicate himself to us in a more intimate manner, it is not through the channel of our presumptuous sciences, but through the humble one of our virtue. He discloses himself to the simple, while he hides his face from the proud.

" But," it is asked, " What made God ? Why should " there be a God ? " Am I then to call in question his existence, because I am incapable of comprehending his origin ? By this mode of reasoning we may equally conclude, that man does not exist : for, Who made men ? Why should there be men ? Why am I in the world in the eighteenth century ? Why did I not arrive in some of the preceding ages, or why should I not be here in those which are to follow ? The existence of God is at all times necessary, while that of man is only contingent. This is not all : the existence of man is the only existence apparently superfluous in the order established upon the earth. Many islands have been discovered without inhabitants, which presented abodes the most enchanting, from the disposition of the valleys, the waters, the woods, and the animals. Man alone deranges the plans of nature : he turns aside the currents of the fountains, he digs into the sides of the hills, he sets fire to the forests, he massacres without mercy every thing that breathes, and he degrades universally the earth, which has no need of him. If but the smallest kind of plant were to be suppressed, the harmony of the globe would in part, perhaps entirely, be destroyed ; for its suppression would leave a certain space of ground without verdure, and a certain species of insect, which subsisted

upon it, without support. The destruction of this insect, again, would involve that of the species of bird which depended upon it for food for its young ; and so on to infinity. The total ruin of the vegetable and animal kingdoms might take its rise from the failure of a single moss, as we see the ruin of an edifice often commence in a small crevice. But if the human race had no existence, it would be impossible to suppose that any thing had been deranged ; every brook, every plant, every animal, would still be in its place. Idle and arrogant philosopher ! You demand of nature, wherefore there should be a God ; why do you not rather ask, wherefore there should be men ?

All the works of God speak of their author. The plain which escapes from my eye, and the vault of heaven which encompasses it, convey to my mind an idea of his immensity ; the fruits suspended on the boughs within reach of my hand, announce his providential care ; the voice of the tempest proclaims his power ; the constant revolution of the seasons, his wisdom ; the variety, which his bounty every where provides for the wants of every thing that lives, the majestic port of the forests, the soft verdure of the meadow, the rich clusters of plants, the perfume and enamel of flowers, an infinite multitude of harmonies, known and unknown, are so many magnificent languages, which speak of him to all men, in a thousand and a thousand different dialects.

The very order of nature is superfluous : God is the only being whom disorder invokes, and human weakness announces. To attain a knowledge of his attributes, we need only to have a feeling of our own imperfections. How sublime is that prayer,* and how congenial to the heart of

* See Flacourt's History of the island of Madagascar, chap. xliv. page 182 : where you will find this prayer, embarrassed indeed with many circumlocutions, but conveying the meaning which I have expressed. That Negroes should have discovered all the attributes of deity, in the imperfections of

man, which is still in use among people whom we call savages? "Have mercy upon me, O Eternal! because I am passing away: O Infinite! because I am but a speck: O Most Mighty! because I am weak: O Source of Life! because I draw nigh to the grave: O Omniscient! because I am in darkness: O All-bounteous! because I am poor: O All-sufficient! because I am nothing."

Man has given to himself no one thing which he possesses: he has received all. And, "he who planted the ear, shall he not hear? He who formed the eye, shall he not see? He who teacheth man knowledge, shall he not know?" I should consider myself as offering an insult to the understanding of my reader, and should derange the plan of my work, were I to insist longer on the proofs of the existence of God. It remains that I reply to the objections raised against his goodness.

"But if there be one God," it is said, "there must be two, a God of nature and a God of religion, for there are two contradictory laws." This is just the same thing with saying, that there must be one God of metals, another God of plants, another of animals, because all these things are subjected to laws peculiar to themselves. Nay, in all the kingdoms of nature, the genera and the species have other laws beside, which are peculiar to them, and which yet, in many cases, are in opposition to each other; but these different laws constitute the happiness of each individual species, and concur, in a most admirable manner, to promote the felicity of the whole.

The laws which govern man are derived from the same plan of wisdom which has constructed the universe. Man is not a being of a nature perfectly simple. Virtue, which

man, is it not singularly astonishing? With just reason has the divine wisdom said of itself, In all the earth, and in every people and nation, I got a possession: *Et in omni terra steti, et in omni populo; et in omne gente primatum habui.* Eccles. chap. xxiv. v. 6.

ought to be the grand object of his pursuit, is an effort which he makes over himself, for the good of mankind, with the view of pleasing God only. It proposes to him, on the one hand, the divine wisdom as a model; and presents to him, on the other, the surest road to happiness. Study nature and you will perceive, that nothing can be more adapted to the felicity of man, and that virtue carries her reward in her bosom, even in this world. Continency and temperance secure his health; contempt of riches and glory, his repose; confidence in God, his fortitude. And in a creature exposed to so much misery, what can be more becoming than modesty and humility? When he has taken his seat on the lowest step, let the revolutions of the world be what they may, he has no fear of falling lower.

Instead of complaining that God has made an unfair distribution of his gifts, when we see the affluence and prosperity of the wicked, let us remember that whatever is most useful, most beautiful and best, upon earth, is within the reach of every man. Obscurity is far better than glory, and virtue of more worth than talents. A small field, a wife and children, with the sun to enlighten and cheer us, are sufficient to supply a constant succession of pleasures. Must we have luxuries too? A flower presents us with colours more lovely than the pearl dragged from the abysses of the ocean; while a coal of fire on the hearth has a brighter lustre, and is infinitely more serviceable, than the famous gem glittering on the head of the Great Mogul.

What, after all, was it incumbent on God to bestow upon every man? Water from the fountain, a little fruit, wool to clothe him, as much land as he is able to cultivate with his own hands, are all that the wants of his body require. As to those of the soul, it is sufficient for him to possess, in infancy the love of his parents; in maturity that of his wife; in old age the gratitude of his children; at all times, the goodwill of his neighbours, of whom the number is

restricted perhaps to four or five, according to the extent and form of his domain ; so much knowledge of the globe as he can acquire within his domestic horizon, or by rambling for a few hours, so as to get home at night to his own habitation ; such a sense of providence as nature gives to all men, and which will spring up equally in his heart after he has made the circuit of his field, as after returning from a voyage round the world. With these enjoyments, corporeal and mental, he ought to be content, and whatever he desires beyond them, is above his wants and inconsistent with the distributions of nature. He can acquire superfluity only at the expence of some necessary ; public consideration, by the sacrifice of domestic happiness ; a name in science, by renouncing his repose. Beside, the honours, the equipage, the wealth, the submission, which we so eagerly pant after, are unjust. Man cannot obtain them but by plundering and enslaving his fellow citizens. Their acquisition too is accompanied with labour, their possession with continual inquietude, and their subsequent privation with the most heart-rending regret. It is by blessings like these that health becomes impaired, and reason and conscience totally depraved. They are as fatal to empires as to families. It was neither by labour, by indigence, nor by wars, that the Roman empire fell into ruin ; but by the pleasures, the refinements, and the luxuries of the earth.

Virtuous individuals, it is true, are sometimes destitute not only of the blessings of society, but of those of nature. But their misfortune is frequently productive to them of benefit. When persecuted by the world, I have remarked that they are usually incited to engage in some illustrious career. Affliction is the path of great talents, or at least of great virtues, which are infinitely preferable. " It may not be in your power," said Marcus Aurelius, " to be a naturalist, a poet, an orator, a mathematician ; but you may be a virtuous citizen, which is still better." I have remarked

too, that no tyranny starts up, of whatever kind, respecting either facts or opinions, without a rival tyranny starting up at the same time to counterbalance it; so that virtue finds a protection from the very efforts made by vice to oppress it. I grant that the good man frequently suffers: but if providence were to interpose for his relief, whenever he asked it, providence would be at his disposal; man would have the direction of his maker. Beside, his virtue in this case would merit no praise. It rarely happens that, sooner or later, he does not behold the downfall of his tyrant. But supposing the worst, and that he fall a victim to tyranny; death at least will terminate his woes. God could owe us nothing. He called us from nonentity into life; in withdrawing life and restoring us to nonentity, he only resumes what he gave: we have therefore nothing of which to complain.

An intire resignation to the will of God ought, in every situation, to tranquilize the heart. But if the illusions of a vain world should interfere to ruffle our spirits, let me suggest a consideration, calculated, in my opinion, to restore them to peace. When any thing in the order of nature bears hard upon us, and inspires a mistrust of its author, let us suppose an order of things the reverse of that which is so galling to us, and we shall find a multitude of consequences resulting from this hypothesis, which would involve much greater evils than those of which we complain. When some imaginary plan of human perfection would attempt to seduce us, we may employ the contrary method. We have but to suppose its existence, and the innumerable absurd consequences with which it is attended will disclose themselves to our view. This twofold method, employed frequently by Socrates, rendered him victorious over all the sophists of his age, and may still be employed with success against the sophists of ours. It is at once a rampart which defends our feeble reason, and a battery that levels with the dust all the

delusions of men. If we would justify the order of nature, we have only, for a moment, to deviate from it; and to refute all human systems, nothing is requisite but to admit them.

For example, we complain of death: but if men were not to die, what would become of their posterity? Long before now there would have been no room for them on the earth. Death, therefore, is a benefit. We complain of the necessity of labouring: but unless we were to labour, how could we pass our time? The reputedly happy, those who have no occupation, are dreadfully at a loss in this respect. Labour, therefore, is a benefit. We envy the beasts the instinct which guides them: but if, like them, we knew from our birth all we were destined to know, what should we do in the world? Life would be loitered indolently away, without interest, and without curiosity. Ignorance, therefore, is a benefit.

The other ills of nature are equally necessary. Pain of body, and vexation of spirit, which so frequently cross the path of life, are barriers erected by the hand of nature to prevent our deviating from her laws. But for pain, our bodies would be shattered to pieces on the slightest shock. But for chagrin, so frequently the companion of our enjoyments, the mind would be the victim of every sickly appetite. Diseases are the efforts of temperament striving to expel some noxious humour. Nature does not inflict them to destroy the body, but to preserve it. They are uniformly the result of some violation of her laws, physical or moral.

The remedy is frequently obtained by leaving her to act in her own way. The regimen of aliments restores health to our body, and that of men tranquillity to our mind. Whatever may be the opinions which disturb us in society, they almost always in solitude vanish into air. Sleep itself even dispels our chagrin more gently, and more infallibly, than a book of morals. If our miseries are so constant and so great as to disturb our repose, we may mitigate them by

having recourse to God. This is the central point towards which all the parts of human life converge. Prosperity invites us to it at all seasons, while adversity leaves us no other choice. Adversity, indeed, is a mean which God employs to force us to take refuge in himself alone. But for this voice, which addresses itself, at one time or other, to every one of us, we should soon forget him, especially in the tumult of great cities, where so many fleeting interests clash with those which are eternal, and where so many second causes swallow up all attention to the first.

As to the evils of society, they are no part of the plan of nature; yet they demonstrate notwithstanding the existence of another order of things: for is it natural to imagine, that a being just and good, who has disposed every thing on the earth so as to promote the happiness of mankind, will suffer them to be deprived of it with impunity? When he has loaded with blessings so many miscreants who abuse his favours, will he do nothing in behalf of the virtuous and unfortunate man, whose constant study was to please him? When he has displayed a bounty which has met with no return, will he fail in executing the necessary justice?

"But every thing," it is said, "dies with us. We have experience of this, and we ought to believe it. We were nothing before we were born, and we shall be nothing after we die." I adopt the analogy; but if I take my point of comparison from the moment when I was nothing, and the moment when I came into existence, what becomes of this argument? One positive proof, is it not better than all the negative ones in the world? You conclude from an unknown past to an unknown future, to perpetuate the nothingness of man; and I, on my part, deduce my consequence from the present, which I know, to the future, which I do not know, as an assurance of his perpetual existence. I presume upon a goodness and a justice to

come, from the instances of goodness and justice which I actually see diffused over the universe.

That we have here the desire only and presentiment of a life to come, and that no one has returned from thence to give us information concerning it, is, because our terrestrial life does not admit of proofs more conformable to our senses. Evidence on this point must be accompanied with the same inconveniencies as that of the existence of God. Were we assured by some sensible demonstration, that a world to come was prepared for us, all the pursuits of this world, I am persuaded, would from that instant be abandoned. This perspective of a divine felicity here below, would throw us into a lethargic rapture.

I remember that on my return to France, in a vessel which had made a voyage to India, the sailors had no sooner distinguished the land of their native country, than they became, in a manner, incapable of attending to the business of the ship. Some looked at it wistfully, without the power of being diverted by any other object; others dressed themselves in their best clothes, as if they had been going that moment to disembark; some talked to themselves, and others wept. As we approached nearer, the agitation of their minds increased. Having been absent several years, there was no end to their admiration of the verdure of the hills, of the foliage of the trees, and even of the rocks which skirted the shore, covered over with sea weeds and mosses; as if all these objects had been perfectly new to them. The spires of the villages where they were born, which they distinguished at a distance in the country, and which they named one after another, filled them with transports of delight. But when the vessel entered the port, and they saw on the quays, their friends, their fathers, mothers, wives and children, stretching out their arms to them with tears of joy, and calling them by their names, it was no longer possible to retain a single man on board; they all

sprung ashore, and it became necessary, according to the custom of the port, to employ another set of mariners to bring the vessel to her moorings. What then would be the case, were we indulged with a sensible discovery of that heavenly country, inhabited by those who are most dear to us, and who alone are worthy of our sublime affections? All the laborious and vain solitudes of the present life would be at an end. The passage from the one world to the other being in the power of every man, the gulf would be quickly shot: but nature has involved it in obscurity, and has placed doubt and apprehension to guard the passage.

We are told by some, " That the idea of the immortality of the soul could have arisen only from the speculations of men of genius, who, considering the combination of the universe, and observing the connexion which present scenes have with those which preceded, must hence have concluded, that they had a necessary connexion also with futurity; or else, that this idea of immortality was introduced by legislators, in a state of polished society, as furnishing a distant hope tending to console mankind under the pressure of their political injustice."

But had this been the case, how could it have found its way into the deserts, and entered the head of a negro, of a Carab, of a Patagonian, of a Tartar? How could it have been diffused, at once over the islands of the south seas, and over Lapland; over the voluptuous regions of Asia, and the rude climates of North America; among the inhabitants of Paris, and those of the New Hebrides? How is it that so many descriptions of people, separated by vast oceans, so different too in manners and in language, should unanimously have adopted one opinion; while many of them frequently affect, from national animosity, a deviation from the most trivial customs of their neighbours? All the nations of the earth believe in the immortality of

the soul. Whence could they have derived an idea so contrary to their daily experience? They every day see their friends die; but they never see them appear again. In vain do they carry viands to their tombs; in vain do they suspend, with tears, on the boughs of the adjoining trees, the objects which in life were most dear to them: neither these testimonies of an inconsolable friendship, nor the vows of conjugal affection, challenged by their drooping mates, nor the lamentations of their dear children, moistening with tears the ground which covers their remains, can bring them back from the land of shadows. What do they expect for themselves from a life to come, who express all this unavailing regret over the ashes of their departed favourites? To the interests of most men, there is no prospect so inimical: for some, having lived a life of fraud, or of violence, have reason to apprehend a state of punishment; others, having been oppressed in this world, might justly fear, that the life to come was to be regulated conformably to the same destiny which presided over that which they are going to leave. Shall we be told, it is pride which cherishes this fond opinion in their breasts? What, is it pride that induces a miserable negro in the West Indies, to hang himself, in the hope of returning to his own country, where a second state of slavery awaits him? Other nations, such as the islanders of Taïti, restrict the hope of this immortality, to a renovation of precisely the same life which they are going to leave. The passions, alas! present to man far different plans of felicity; and the miseries of his existence, and the illumination of his reason, would long ago have destroyed the life that is, had not the hope of a life to come, in the human breast, been the result of a supernatural feeling.

“ But why, of all animals, is man the only one subjected to other evils than those of nature? Disposed as he is to go astray, why should he be abandoned to his

"own guidance? He is, therefore, the victim of some
"malignant being."

It is the province of religion to take us up where philosophy leaves us. The nature of the ills which we endure unfolds their origin. If man renders himself unhappy, it is because he wished to be himself the arbiter of his felicity. Man is a god in exile. The reign of Saturn, the golden age, Pandora's box, from which issued every evil, and at the bottom of which hope alone remained, with a thousand similar allegories, diffused over all nations, attest the happiness and the fate of a first man.

But we need not have recourse to foreign testimonies. We carry in ourselves the most unquestionable evidence. The beauties of nature bear witness to the existence of God, and the miseries of man to the truths of religion. There is not an animal upon the earth but what is lodged, clothed, fed, by the hand of nature, without care, and almost without labour. Man alone is overwhelmed with calamity from his birth. First, he is born naked, and is endowed with so little instinct, that, if the mother who bare him were not to rear him for several years, he would perish of hunger, of heat, or of cold. He knows nothing but from the experience of his parents. For eight or ten years, at least, they are under the necessity of lodging him, of weaving garments for him, and of providing him with food. Whatever encomiums might have been passed on certain countries for their fertility, and the mildness of their climate, I know of no spot upon the globe, in which subsistence of the simplest kind can be procured by man without both solicitude and labour. In India, he must have a roof over his head, to shelter him from the heat, from the rains, and from the insects. He must cultivate rice, must weed it, thresh it, shell it, dress it. The banana, the most useful of all its vegetables, stands in need of being watered, and must also be hedged round, to secure it from

the attacks of the wild beasts by night. Magazines, too, must be provided for the preservation of food during those seasons when the earth produces nothing. When he has thus collected around him every thing necessary to a quiet and comfortable life, ambition, jealousy, avarice, gluttony, incontinence, or languor takes possession of his heart. In almost every instance, he perishes, the victim of his own passions. To have sunk thus below the level of the beasts, man must undoubtedly have aspired to a level with the Deity.

Wretched and self-deluded mortals ! Seek your happiness in virtue, and you will no longer have to complain against nature. Despise that vain knowledge, and those unreasonable prejudices, which have corrupted the earth, and which every age subverts in its turn. Let the laws which are eternal, be the object of your affections. Your destiny is neither abandoned to chance, nor to mischievous demons. Recal those times, the recollection of which is still fresh among all nations. The brute creation every where found means of supporting life ; man alone had neither aliment, nor clothing, nor instinct. Divine wisdom left him to himself, thereby to bring him back to the Deity. She scattered her blessings over the whole earth, that, in order to gather them, he might explore every different region, might expand his reason by the inspection of her works, and become enamoured of her beauties from a sense of her benefits. She placed between herself and him, harmless pleasures, rapturous discoveries, pure delights, and endless hopes, thereby, step by step, to lead him into her sanctuary, through the path of knowledge and happiness. She fenced his way on both sides by fear, by languor, by remorse, by pain, by all the ills of life, as boundaries destined to prevent him from wandering and losing himself. Thus a mother, anxious for the welfare of her child, scatters fruit along the ground to induce him to walk ; she keeps at a

distance, she encourages him with her smiles, calls him, stretches out her arms towards him: but if he happen to fall, she flies to his assistance, she wipes away his tears, and comforts him. Thus providence interposes for the relief of man, supplying his wants in a thousand extraordinary ways. What would have become of him in the earliest ages had he been abandoned to his own reason, as yet unaided by experience? Where did he find the corn, which constitutes, at present, a principal part of the food of so many nations, and which the earth, while it produces all sorts of plants without cultivation, nowhere exhibits? Who taught him agriculture, an art so simple that the most stupid of mankind is capable of learning it, and yet so sublime, that the most intelligent of animals can never practise it? There is scarcely a single animal that does not support its life by means of vegetables, that has not daily experience of their re-production, and that does not employ, in search of those which it likes, more combinations by far than would have been necessary for re-sowing them. But on what did man himself subsist, before an Isis or a Ceres revealed to him this blessing of the skies? Who shewed him, in the infancy of the world, the original fruits of the orchard, scattered over the forests, and the alimentary roots concealed in the bosom of the earth? Must he not a thousand times have died of hunger, before he had collected a sufficiency to support life, or of poison, before he had learned to select, or of fatigue and restlessness, before he had formed round his habitation grass plots and arbours? This art, the image of creation, was reserved for that being alone upon whom was stamped the impression of the Divinity.

If providence had abandoned man to himself, when he first proceeded from his hands, what would have become of him? Could he have said to the plains: Ye unknown forests, shew me the fruits which are my inheritance?

Thou earth, open, and disclose to me, in the roots buried under thy surface, my destined aliment? Ye plants, on which depends my existence, declare to me your qualities, and supply the instinct which nature has denied? Could he have applied in his distress to the compassion of the brutes, and, perishing with hunger, have said to the cow: Take me into thy family, and let me share with thy offspring the produce of one of thy superfluous teats? When the breath of the north pierced his unclothed body with cold, would the wild goat and timid sheep have run at his call to warm him with their fleeces? Wandering without a protector, and without an asylum, when he heard by night the howling of ferocious animals, demanding their prey, could he have made supplication to the generous dog, and said to him: Be thou my defender, and I will make thee my slave? How could he have subjected to his authority so many animals which stood in no need of him, which surpassed him in cunning, in speed, in strength, unless the hand which, notwithstanding his fall, destined him still to empire, had humbled their heads to the obedience of his will?

With a reason less infallible than animal instinct, how was it possible for him, to raise himself to the heavens, to measure the course of the stars, to cross the ocean, to call down the thunder, to imitate most of the works and appearances of nature? We are now struck with astonishment at all these things: but what rather astonishes me is, that a sense of Deity should have spoken to his heart, long before a comprehension of the works of nature had perfected his understanding. View him in his savage state, engaged in perpetual war with the elements, with beasts of prey, with his fellow-creatures, with himself, frequently reduced to situations of servitude which no other animal could possibly support: and yet he is the only being who discovers, in the very depth of misery, the character of infinity, and the

restlessness of immortality. He erects trophies; he engraves the record of his achievements on the bark of trees; he celebrates his funeral obsequies, and reveres the ashes of his forefathers, from whom he has received so fatal an inheritance.—Observe, again, the rage of love or of vengeance incessantly agitating him. When he is not the victim of his fellow men, he is their tyrant: and he alone knows that justice and goodness govern the world, and that virtue exalts man to heaven.—He receives, from his cradle, none of the presents of nature, no soft fleece, no plumage, no defensive armour, no tools, for a life so painful and so laborious: and he is the only being who invites the gods to his birth, to his nuptials, and to his funeral obsequies. Misled, as he may have been, by extravagant opinions, when he is struck by some unexpected burst of joy or grief, his soul, by an involuntary movement, takes refuge in the bosom of the Deity. He calls instantly upon God; he raises to heaven hands of supplication and eyes bathed with tears, in hope of finding there a father. How strongly do the wants of man attest the providence of a supreme being! He made him feeble and ignorant, only that he might be stayed by his strength, and illuminated by his wisdom; and so far is it from being true, that chance, or malignant spirits, have domineered over a world, in which every thing concurred to destroy a creature so deplorable and wretched, his preservation, his enjoyments, and his empire demonstrate that, at all times, a beneficent God has been the friend and protector of human life!

STUDY IX.

OBJECTIONS AGAINST THE METHODS OF OUR REASON, AND THE PRINCIPLES OF OUR SCIENCES.

I HAVE displayed, in the beginning of this work, the immensity of the study of nature. I have next suggested new plans to assist us in forming an idea of the order which nature has established in her several kingdoms; but, checked by my own insufficiency, all I could promise as to the vegetable kingdom, was to trace a slight sketch only of the order that I conceived to prevail in it. Before I proceeded to lay down new principles on this subject, I thought it of importance to refute the prejudices which the world, and our sciences themselves, might have diffused over nature, in the minds of my readers. Accordingly, I have enumerated, in a cursory manner, the blessings of Providence to the children of the present generation, and the objections which have been raised against its existence. I have also replied to those objections, in the same order in which I had stated them, pointing out, as I went along, the wonderful harmony which is observable in the distribution of the globe, abandoned, as some would have it, to the simple laws of motion and of chance. I have farther presented a new theory of the courses of the tides, of the motion of the earth in the ecliptic, and of the universal deluge: and I am now going to attack, in my turn, the methods of our reason, and the elements of our sciences, in order to clear the way for the establishment of other principles, which

may indicate to us an infallible road to the discovery of truth.

Let me not however be misunderstood. Wherever in the course of this work, and particularly in this article, I have combated our natural sciences, it is so far only as system is concerned: on the side of observation I give to the sciences full credit. I highly respect also the persons who cultivate them. Next to the virtuous man, I know of nothing in the world more estimable than the man of real knowledge, if, indeed, the sciences and virtue can possibly be separated. What sacrifices and privations does not the study of them demand? While the herd of mankind is becoming rich and illustrious by agriculture, commerce, navigation, and the arts, it has been frequently seen, that those who made the first discovery and removed the obstacles that stood in the way of these pursuits, lived themselves in indigence, unknown to, and disregarded by, their contemporaries. The man of science, like the torch, illuminates all around him, and remains himself in obscurity.

I have attacked then, neither the learned, whom I honour, nor the sciences which have been the consolation of my life; but, if time had permitted, I would have disputed every inch of ground with our methods and our systems. They have poured upon us such a torrent of absurd opinions in every branch of scientific research, that I do not hesitate to affirm, that our libraries abound, at this day, more with falshood than truth, with ignorance than knowledge; and I would even wager, that, were a blind man to be introduced into the king's library, for example, and were to take a book from it at random, the first page of that book, on which he may so chance to lay his hand, shall contain some error. How many probabilities should I have in my favour, among romance writers, poets, mythologists, historians, panegyrists, moralists, naturalists of ages past, and metaphysicians of all ages and of all countries? There is a method, indeed,

simple in itself, by which to check the mischief which their opinions might produce; which is, to arrange all the books which contradict themselves by the side of each other; and as these, in every walk of literature, are almost infinite in number, the result of human knowledge, as far as books convey it, will be thereby reduced nearly to a cypher.

It is by our very methods of acquiring knowledge that we are deluded into error. For, in the first place, to succeed in the search of truth, we ought to be free from the influence of passion; and yet, from our earliest infancy, the passions are purposely set afloat, and reason hence receives its first perversion. The maxim laid down as the fundamental basis of all conduct and of all opinion is, *make your fortune*. Of consequence, we no longer prize any thing but what has some relation to this desire. Even natural truths vanish out of sight, because we no longer contemplate nature, except in the inventions of men, in books and instruments. That we may believe in God, some person of consequence must assure us there is a God. If Fenelon tell us it is so, we admit it, because Fenelon was preceptor to the duke of Burgundy, was an archbishop, a man of quality, and addressed by the title of My Lord. We are fully convinced of the existence of God by the arguments of Fenelon, because his credit reflects credit upon ourselves. I do not affirm, however, that his virtue added no degree of authority to his reasonings, but it was only in as much as it stands connected with his reputation and his fortune; for if this same virtue were to be seen in one of our poor water-carriers, its lustre would fade in our eyes. To no purpose might such a one furnish proofs of the existence of a God, more unanswerable than all the speculations of philosophy, in a life exposed to contempt, hardships, toil, poverty, yet exhibiting uniform probity and fortitude, and passed in perfect resignation to the will of heaven. These testimonies so positive, are of no consideration with us; we value them

as important only when they have acquired celebrity. Let some emperor be disposed to adopt the philosophy of this obscure individual, and his maxims will be extolled in every book, quoted in every academical thesis; engraved portraits of the author would decorate every pannel, and his bust, in plaster of Paris, grace every chimney; he would become instantly an Epictetus, a Socrates, a Rousseau. Should a period one day arrive, in which men of as high reputation as the philosophers I have mentioned should start up, should be in favour with powerful princes, whose interest it might be that there should be no God, and, to make their court to such princes, should deny his existence; from the same effect of our education, which engaged us to believe in God, on the faith of Fenelon, Epictetus, Socrates, and Rousseau, we should renounce our belief on the credit of the others, and the more so, because, separate from their being men of such high consideration, they would be so much nearer to us. It is thus our education warps us: it disposes us to preach indifferently the Gospel or Alcoran, according as our interest is concerned in the one or the other.

It was from this source arose the maxim, so universal and so pernicious—*primo vivere, deinde philosophari*;—live first, and seek wisdom afterwards. The man who is not ready to give his life in exchange for wisdom, is unworthy of knowing her. How infinitely more rational is the sentiment of Juvenal?

Summum crede nefas vitam præferre pudori;

Et prompter vitam, vivendi perdere causas. Sat. viii.

“To prefer life to honour, and for the sake of a paltry existence, to sacrifice that which alone renders life desirable, believe me, is the most abject of all things.”

There are other prejudices that oppose themselves to the investigation of truth, which I have not mentioned, such as those of ambition, stimulating every one of us to dis-

tinguish himself. Now for all to do this is hardly possible, except in two ways, either by subverting those maxims of truth which are the most firmly established, in order to substitute our own in their place; or by seeking to please all parties by the union of opinions the most contradictory. Each of these modes is accordingly practised, and by means of them the ramifications of error are multiplied to infinity. There are other obstacles to truth, and these not few in number, which arise on the part of powerful men, to whom error proves advantageous. But I shall confine myself to those only which are to be imputed to the weakness of our reason, and shall examine their influence on our acquirements in natural knowledge.

It requires no penetration to perceive, that most of the laws which we have assigned to nature, have been deduced sometimes from our weakness, and sometimes from our pride. I shall take a few instances of such laws, as they occur to my thoughts, and among the class of those considered by us as most certain. For example, we have supposed that the sun, to regulate their motion, must be in the center of the planets, because we are under the necessity, on our part, of placing ourselves in the centre of our personal concerns, for the purpose of keeping an eye over them. But if, as to the celestial spheres, the centre naturally belongs to the most considerable bodies, how is it that Saturn and Jupiter, which greatly exceed our globe in magnitude, should be at the extremity of our vortex? Again,

Because, with us, the shortest road is the least fatiguing, we have concluded, in like manner, that this must also be the case with nature. In consequence, to spare the sun a journey of about ninety millions of leagues, which he must every day perform in giving us light, we make the earth turn round its own axis. It may be so; the earth may revolve in this manner; but if it does, there must be a great difference in the space passed through by two cannon balls,

shot off at the same instant, the one toward the east, and the other toward the west; for the first proceeds with the motion of the earth, and the second in the opposite direction. While both are flying in the air, and removing to a distance from one another, each at the rate of six thousand fathoms in a minute, the earth, during that same minute, is outflying the first, and removing from the second, with a velocity which carries it along at the rate of sixteen thousand fathoms, which must place the point of their departure twenty-two thousand fathom behind the ball which is proceeding to the west, and ten thousand fathom before that which is flying to the east.

I once proposed this difficulty to a very able astronomer, who considered it almost as an insult. He replied, as is the custom of our doctors, that the objection had been made long before, and resolved. At last, as I intreated him to have compassion on my ignorance, and to give me some kind of solution, he retailed to me the pretended experiment of a ball dropped from the top of a ship's mast, when under sail, and which falls on deck close to the mast, notwithstanding the ship's progressive motion. "The earth," said he, "carries the rotation of the two balls along with it in its own movement; and if they were to be shot off in a perpendicular direction, they would fall back precisely on the point from whence they were emitted." As axioms cost nothing, and serve to cut short all difficulties, he added also, that, "the motion of a great body absorbs that of a small one." If this axiom be founded in truth, said I, the ball dropped from the top of the mast of a ship under sail, ought not to fall by the side of the mast; its motion ought to be absorbed, not by that of the vessel, but by that of the earth, which is the greater body; it ought to obey only the direction of gravity; and for the same reason, the earth ought to absorb the motion of the ball which is going with it towards the east, and ought to force it back into the cannon from which it issued.

I was unwilling to push this difficulty any farther ; but I remained, as has frequently happened to me after the most luminous solutions of our schools, still more perplexed than before. I began to call in question the truth, not only of a system and an experiment, but what is worse, of an axiom. Not that I reject our planetary system, such as it is given us ; on the contrary, I adopt it, for the same reason which first suggested it ; from its being the best adapted to the weakness of my body and my mind. I find, in fact, that the rotation of the earth, every day, saves the sun a prodigious journey : but, in other respects, I by no means believe that this system is that of nature, and that she has disclosed to men the causes of motion, who are incapable of accounting for the movement of their own fingers.

There are circumstances favourable to the sun's motion round the earth, of which the following, extracted from the *Courier de l'Europe*, is one. " The astronomers of Greenwich, having discovered that a star of Taurus has a declination of two minutes, every twenty-four hours ; that this star not being dim, and having no train, cannot be considered as a comet, communicated their observations to the astronomers of Paris, who found them accurate. M. Mefsier was accordingly appointed to make a report of this to the Academy of Sciences, at their next meeting."*

If the stars are suns, here is a sun then in motion, and that motion is a presumption, at least, that ours also may move.

There are other circumstances, on the contrary, from which the stability of the earth may be presumed ; as, for instance, that the distance of the stars never changes with respect to us, which must perceptibly take place, if we performed every year, as is alleged, a round of sixty-four millions of leagues in diameter through the heavens ; for in a space so vast, we must, of necessity, draw nigher to some, and remove farther from others.

* Friday, 4th May, 1781.

But sixty-four millions of leagues, it is said, dwindle, in the heavens, to a mere point, when compared to the distance of the stars. I have my doubts upon this subject. The sun, which is a million times greater than the earth, presents to us an apparent diameter of only six inches, at the distance of thirty two millions of leagues from us. If this distance reduce a body so immense, to a diameter so small, doubtless, at double the distance, namely, sixty-four millions of leagues, it would be diminished still more, and be reduced, perhaps, to the apparent magnitude of a star; and it is by no means impossible, that, on being thus diminished, and on our still removing sixty-four millions of leagues farther, it would entirely disappear. How happens it then, that when the earth approaches, or removes to this distance from the stars in the firmament, in performing its annual circle, no one of those stars, as to us, either increases or diminishes in magnitude?

There are other circumstances again, tending to prove, that the stars have, at least, motions peculiar to themselves. The ancient astronomers have observed, in the neck of the whale, a star which exhibited considerable variety in its appearances; sometimes it was visible for three months together, sometimes during a longer interval; sometimes its apparent magnitude was greater, sometimes smaller; and the season also of its appearances was irregular.—The same astronomers report, that they had observed a new star in the heart of the swan, which, from time to time, was not to be seen. In the year 1600, it was equal to a star of the first magnitude, but it gradually diminished, and at length totally disappeared. M. Cassini perceived it in 1655. It increased for five years successively; it then began as gradually to decrease, till it became no longer visible. In 1670 a new star was observed near the head of the swan. Father Anselm, a Carthusian friar, and several other astronomers, made the observation. It disappeared in the

same year, and became visible again in 1672. From that period it was seen no more till 1709, and in 1713 it totally disappeared.

These examples prove, not only that the stars have motions, but that they describe curves very different from the circles and the ellipses which we have assigned to the heavenly bodies. I am persuaded, that there exists in these motions of the heavenly bodies, the same variety as between those of many terrestrial bodies; and that there are stars which describe cycloïds, spirals, and many other curves, of which we have not so much as an idea.

I must proceed, however, no farther with this enquiry, lest I should appear better informed respecting the affairs of heaven, than respecting those which are much nearer to us. All I intended was to expose my doubts and my ignorance. If stars are suns, then there must be suns in motion; and ours surely may be in motion as well as they.*

It is thus that our general maxims become the sources of error; for whatever appears to recede from our pretended order, we never fail to charge with disorder. The maxim which I quoted before, namely, that nature, in her operations, takes always the shortest road, has filled our physics

* I leave the reader to reflect as he pleases on the total disappearances of the stars I have mentioned, and of which there are other instances. The ancients had observed seven stars in the Pleiades; but six only are now perceptible. The seventh disappeared at the siege of Troy. Ovid says, it was so affected by the fate of that unfortunate city, as to cover its face with its hands from grief. I find, in the book of Job, a curious passage which seems to presage this disappearance: it is chap. xxxviii. ver. 31. — *Numquid conjungere valebit micantes stellas pleiades, aut gyrum arcturi poteris dissipare?* — “Canst thou unite together the brilliant stars of the pleiades; and turn aside the great bear from its course?” This is the import of the translation of M. le Maitre de Sacy. If, however, I might venture an opinion after so learned a man, I would give to the conclusion of the passage a different meaning. *Gyrum arcturi dissipare*, means, in my opinion, “to dissipate the attraction of the arctic pole.” I repeat here what I have observed before, that the book of Job is replete with the most profound knowledge of nature.

with false views innumerable. There is nothing, however, more flatly contradicted by experience than this idea. Nature makes the waters of the rivers to meander through the land, instead of transmitting them in a straight line, in their progress to the sea. She causes the veins to perform a winding course through the human body; nay, she has perforated certain bones, expressly to afford a passage to some of the principal veins into the interior of the stronger limbs, and to prevent their being exposed to injury by external concussions. In a word, she expands and completes a mushroom in a single night, while, to bring an oak to perfection, she employs a century. Nature seldom takes the nearest road, but always that which is best adapted to the purpose.

This rage for generalizing has dictated to us, in every branch of science, an infinite number of maxims, sentences, adages, which are incessantly contradicting one another. It is one of our maxims, that a man of genius catches every thing at a glance, and executes what he intends by a single law. For my own part, I consider this sublime method of observing and executing, as one of the strongest proofs of the weakness of the human mind. It is in a single path only that man can proceed with confidence. As soon as a variety presents itself, he becomes perplexed, and goes astray; he is at a loss to ascertain which he ought to pursue: that he may make sure of not deviating, he admits only one to be right; and, once engaged in this path, right or wrong, pride stimulates him forward. The author of nature, on the contrary, embracing in his infinite intelligence all the spheres of all beings, proceeds to their production by laws as various as his own inexhaustible conceptions, in order to the attainment of one single end, which is their general good. Whatever contempt philosophers may express for final causes, they are the only causes which he permits us to know. All the rest he is pleased to conceal from us;

and it is well worthy of being remarked, that the only end which he discovers to our understanding, is the same with that which he proposes to our virtues.

One of our most ordinary methods, when we catch some glimpse of nature, is to dwell upon it, at first, from weakness, and afterwards to deduce from it an universal principle, out of vanity. If, after this, we can but contrive the means, and it is no difficult matter, of applying to it a geometrical theorem, a triangle, an equation, if it be merely an $a + b$, this is sufficient to render it for ever venerable. It was thus that, in the last age, every thing was explained on the principles of the corpuscular philosophy, because it was perceived that some bodies were formed by intus-susception, or an aggregation of parts. A seasoning of algebra, which was added, invested it with so much the more dignity, as most of the reasoners of those times understood nothing of the matter. But, being indifferently endowed, its reign was of short duration, and now the names of a long list of learned and illustrious personages, whom all Europe then concurred in covering with laurels, are never so much as mentioned.

Others, having found out that air acted upon bodies in the way of pressure, set to work, with every species of machinery, to demonstrate that air had gravity. Accordingly our books referred every thing to the gravity of the air; vegetation, the human temperament, digestion, the circulation of the blood, with the whole phenomena and ascension of fluids. They found themselves, it is true, somewhat embarrassed by capillary tubes, in which the fluid ascends, independently of the action of the air. But a solution was found for this likewise; and woe betide those, in the phrase of certain writers, who do not comprehend it! Others applied themselves to the investigation of its elasticity, and explained, equally well, all the operations of nature, by this quality as by the other. The universal cry now was,

the veil is removed, we have caught her in the fact. But did not the savage know, when he walked against the wind, that air had both gravity and elasticity? Did he not employ both those qualities in managing his canoe when under sail? I do not object to investigation; if natural effects, after exact calculation and unequivocal experiment, were applied to the necessities of human life, it would be well; but the misfortune is, they are for the most part introduced for the purpose of regulating the operations of nature, and not our own operations.

Others find it still more commodious to explain the system of the universe, without deducing from it any consequence. They ascribe laws to it, of so much accuracy and precision, that nothing is left for divine providence to do. They represent the supreme being as a geometrician, or a mechanist, who amuses himself with making spheres, merely for the pleasure of seeing them revolve. To harmonies, and other moral causes they pay no regard. Though the exactness of their observations may do them honour, their results are by no means satisfactory. Their manner of reasoning on nature resembles that of a savage, who, upon observing, in one of our cities, the motion of the indexes of a public clock, and seeing, that, on their pointing in a certain direction upon the hour plate, the bells began to sound, crowds to issue into the streets, and a considerable part of the inhabitants to be put in motion, should thence conclude, that, a clock was the principle of all European occupations. This is the defect to be imputed to most of the sciences, which, without consulting the end of the operations of nature, perplex themselves in an unprofitable investigation of the means. The astronomer considers only the course of the stars, without paying the slightest attention to the relations which they have with the seasons. Chemistry, having discovered in the aggregation of bodies, saline particles, which assimilate, sees nothing but salt as

the principle and the object. Algebra, having been invented to facilitate calculation, has degenerated into a science which calculates only imaginary magnitudes, and which proposes to itself theorems only, totally inapplicable to the wants of human life. From all this results a complication of disorders, a mass of perplexities, greater than I am able to express. The view of nature, which suggests to the most savage nations, not only the idea of a God, but that of an infinity of Gods, presents to the philosophers of the day only so many furnaces, spheres, stills, and crystallizations. The Naiads, the Sylvans, Apollo, Neptune, Jupiter, impressed upon the ancients some respect, at least, for the works of creation, and attached them also to their country by a sentiment of religion. But our machinery destroys the harmony both of nature and society. The first is nothing more than a gloomy theatre, composed of levers, pulleys, weights, and springs; and the second, a school for disputation. But these systems, we are told, serve to exercise the mind. This might be, if they did not at the same time mislead the mind: and the heart, unfortunately, is no less in danger of being depraved by them. While the head is laying down principles, the heart is frequently deducing consequences. If every thing is the production of unintelligent powers, of attractions, of fermentations, of the play of fibres, of masses, we must submit to their laws as do all other bodies. Women and children draw these inferences. In the mean time what becomes of virtue? We must submit, you say, to the laws of nature? That is, we must obey the power of gravity, sit down, and walk no more. Nature speaks to us by a hundred thousand voices. Which of them is it that is now sounding in our ears in these arguments? What, shall we adopt as the rule of life, the examples of fishes, of quadrupeds, of plants, or even of the heavenly bodies?

There are metaphysicians, on the contrary, who, without paying regard to any one law of physics, explain to you the

whole system of the universe, by means of abstract ideas. But, as a proof that their system is not the system of nature, it would be easy, with the same materials and method, to subvert their order, and to frame another totally different out of it, provided we were disposed to take the small trouble which it requires. And hence arises a reflection calculated to humble the pride of human understanding; which is this, that all these efforts of the genius of man, so far from being able to construct a world, are incapable of putting in motion so much as a grain of sand.

There are others, who consider the state in which we live as a state of progressive ruin and of punishment. They proceed, in conformity to the Scriptures, upon the supposition, that the earth once existed with other harmonies. I readily admit what the Scriptures say on this subject, but I object to the explanations of commentators. Such is the weakness of our intellectual powers, that we are incapable of conceiving or imagining any thing beyond what nature actually exhibits to us. They are grossly mistaken, therefore, who affirm, that, when the earth, for instance, was in a state of perfection, the sun was constantly in the equator; that the days and nights were perpetually equal; that there was an eternal spring; that the whole face of the ground was smooth and level; with other similar absurdities. If the sun were constantly in the equator, I question whether a single spot of the globe would be habitable. First, the torrid zone would be burnt up by his fervent heat, as we have already demonstrated; the two icy zones would extend much farther than they do at present; the temperate zones would be at least as cold toward their middle, as they are with us at the vernal equinox; and by this temperature the majority of our fruits would be prevented from coming to maturity. I know not where the perpetual spring would be; but if it could any where exist, autumn there, certainly, could never exist also. The case would be still

were, were there neither rocks nor mountains on the surface of the globe, for not a single river, nor even a brook of water would flow over the whole earth. There would be neither shelter nor reflexion, to the north, to cherish the germination of plants, and there would be neither shade nor moisture, to the south, to preserve them from heat. In Finland, in Sweden, at Spitzberghen, and over the whole northern regions, which become loaded with rocks in proportion as the latitude increases, these wonderful arrangements actually exist; and they are found, in like manner, in the Antilles, in the Isle of France, and in all the other islands and districts comprehended between the tropics, where the face of the ground is covered with rocks, especially toward the line, in Ethiopia, the territory of which nature has overspread with vast and lofty rocks, almost perpendicular, which form all around them deep vallies, delightfully shady and cool. Thus, as was before observed, in order to refute our pretended plans of perfection, we have nothing to do but to admit them.

There is another class of literati, on the contrary, who never depart from their routine, and who abstain from looking at any thing in any other track, however rich it may be in facts: these are the botanists. They have observed the sexual parts in plants, and employ themselves entirely in collecting and arranging them, conformably to the number of those parts, without troubling themselves with knowing any thing farther about them. When they have classed them in their heads and in their herbals, into umbellated, rose-formed, or tubelous, with the number of their stamina, and have affixed to them, that is if they are able, certain Greek terms, they are possessed, as they imagine, of the complete system of vegetation. To do them justice, however, there are others who go farther, who study the principles of plants, and who, to attain their end, pound them in mortars, or dissolve them in their alembics. The process

being completed, they exhibit salts, oils, earths; and tell you gravely, these are the principles of such and such a plant. For my own part, I no more believe that a man can show me the principles of a plant in a phial, than he can exhibit those of a wolf, or of a sheep, in a kettle. I respect the mysterious operations of chemistry; but whenever they act on vegetables, the process always destroys them. Permit me to quote the decision which an eminent physician has pronounced on his own experiments. I mean Doctor J. B. Chomel, in the preliminary discourse to his useful Abridgment of the History of Common Plants.*

"Nearly two thousand analyses," says he, "of different plants, made by the chemists of the Royal Academy of Sciences have afforded us no farther information than this, that from all vegetables may be extracted a certain quantity, more or less, of an acid liquor, of essential or fetid oil, of salt fixed, volatile, or concrete, of insipid phlegm, and of earth; and, in many cases, almost the same principles, and in the same quantities, from plants whose virtues are extremely different. This very tedious, and very painful pursuit has, accordingly, turned out a mere useless attempt toward the discovery of the effects of plants; and has served only to undeceive us, respecting the prejudices which might have been entertained in favour of such an analysis." He adds, that the celebrated chemist Homberg, having sown the seeds of the same plants in two frames, filled with earth impregnated with a strong lye, of which the one was afterwards watered with common water, and the other with water in which nitre had been dissolved, those plants reproduced very nearly the same principles. Here, then, is our systematic science completely overturned, for it can discover the essential qualities of plants, neither by their composition nor their decomposition.

* Vol. i. page 37.

Many other errors have been adopted respecting the laws of their fecundation and their growth. The ancients had distinguished in many plants, males and females, and a fecundation, by means of emanations of the seminal powder, as, for instance, in the date-bearing palm tree. This law we have applied to the whole vegetable kingdom. It embraces no doubt a very extensive field ; but how many vegetables, propagate themselves also by suckers, slips, shoots, and the extremities of their branches? There are then, in the same kingdom, various methods of re-production. Nevertheless, when we perceive no longer in nature the law which has once been adopted in our books of science, we are weak enough to imagine that she has gone astray. We have only one thread, and when it snaps, we conclude, that the system of the universe must be on the point of dissolution. The moment our own reason happens to be disturbed, the supreme intelligence entirely disappears from our eyes. I have no doubt, however, that the author of nature has established laws for the vegetable world, now so generally studied, which are still utterly unknown to us. I subjoin an observation on this subject, which I submit to the experience of my readers.

Having transplanted, in the month of February of the year 1783, some simple violet plants, which had begun to push out small flower buds, their expansion, in consequence of this transplantation, was checked in a very extraordinary manner. These small buds never came into flower, but their ovary having swelled, attained the usual size, and changed into a capsula filled with seeds, without displaying outwardly or inwardly, either petal, or anthera, or stigma, or any part whatever of the flower. They presented successively the same phenomena in the months of May, June, and July, but no one of the plants presented the least semblance of a flower. I only perceived in the shooting buds which I opened, the parts which

should have composed the flower withered within the calix. I sowed again their seeds which had not been fecundated, and hitherto they have not sprung up. This experiment is so far favourable to the Linnæan system; but in another respect it is a deviation from it, as it demonstrates the possibility of a plant's producing fruit without having flowered.

We may remark here, that physical laws are subordinate to the laws of utility; that is, to give an instance, the laws of vegetation are adapted to the preservation of sensible beings, for whose use they were designed. Accordingly, though the flowering of my violet may have been interrupted, this did not prevent the production of its seeds, which were destined to be the subsistence of some animal, whose natural food it is. For this reason too, the most useful plants, such as the gramæonous, are those which have the greatest variety of methods to re-produce themselves. If nature had confined herself respecting them, rigidly to the law of florification, they could not multiply, when grazed upon by cattle which continually consume their tops. It is the same with those which grow along the water side, as reeds, and aquatic trees, willows, alders, poplars, ozers, mangroves, when the waters swell, and bury them in sand, or totally submerge them, as is frequently the case. The shores would remain destitute of verdure, if the vegetables which are proper to them had not the faculty of reproduction by means of their own shoots. But the case is different with respect to the trees of the mountains, as palm trees, firs, cedars, larches, pines, which are not exposed to similar accidents, and which cannot be propagated by slips. Nay, if you cut off the summit of the palm tree, it dies.

We find these same laws of adaptation and utility in the generation of animals, to which we ascribe uncertainty, as soon as we perceive variety, or when we apprehend an approximation to the vegetable kingdom by

means of imaginary relations, suggested by the perception of effects common to both. Thus, for example, if some of our most delicate insects are viviparous in summer, it is because their young find, at that season, the temperature and food which are adapted to them on coming into the world; and if they are oviparous in autumn, it is because the posterity of creatures so tender could not have survived the winter, without having been shut up in eggs. For similar reasons, if you tear off a claw from a live crab or lobster, it pushes out another, which springs out of its body, as a branch out of a tree. Not that this animal reproduction is the effect of any mechanical analogy between the two kingdoms: but those animals being destined to live on the shores among the rocks, where they are exposed to the agitation of the waves, nature has bestowed on them the faculty of re-producing the limbs exposed to be bruised, or broken off, by the rolling about of rocky substances, as she has given to vegetables which grow by the waters, the power of re-production by shoots, because they are exposed to the danger of being overwhelmed by inundations.

Medicine has produced from these apparent analogies of the vegetable and animal kingdoms, a multitude of errors. It is sufficient to examine the course which this science pursues in its studies, to be satisfied that they are liable to strong suspicions. It searches for the operations of the soul through the structure of a corpse, and the functions of life in the lethargy of death. If it happens to perceive some valuable property in a vegetable, it exalts it into an universal remedy. Listen to its adages. Plants are useful to human life: hence it infers, that, by subsisting on a vegetable diet, man ought to live for ages. It is impossible to enumerate the books, the treatises, the panegyrics, which have been written on the virtues of plants. Multitudes of patients die, notwithstanding, with their stomach full of those wonderful simples. Not that I undervalue

their qualities, when judiciously applied ; but I absolutely reject the reasonings which would connect the duration of human life with the use of a vegetable regimen. The life of man is the result of the moral adaptations, and depends much more upon sobriety, temperance, and the other virtues, than upon the nature of aliments. The animals which live entirely on plants, do they ever attain even the age of man ? The deer and wild-goats, which feed on the admirable vulnerable herbs of Switzerland, ought, upon the position we are combating, never to die ; yet, they are very short-lived. The bees which suck the nectar of their flowers, likewise die, and several of their species in the space of a year. There is a limited term fixed for the life of every kind of animal, and a regimen peculiar to it ; while that of man alone extends to every variety of aliment. The Tartar lives on raw horse-flesh ; the Dutchman on fish : one nation on roots, another on milk diet ; and in all countries you find old people. Vice alone, and mental uneasiness, shorten human life ; and I am persuaded, that the moral affections are of such extensive influence, with respect to man, that there is not a single disease to which he is liable, but what owes to them its origin.

Hear what Socrates thought of the systematic philosophy of his age ; for in all ages, philosophy has abandoned itself to the same extravagancies. " Socrates did not amuse himself," says Xenophon,* " with researches into the mysteries of nature, or with enquiring in what manner that which the sophists call the world, was created ; nor what elastic force governs all celestial things : on the contrary, he exposed the folly of those who addict themselves to such contemplations, and demanded, if it was in consequence of having acquired a perfect knowledge of human things, that they undertook the investigation of those

* Xenophon's Memorable Things of Socrates, book I.

“ which are divine ; or whether they considered it as a
“ character of true wisdom, to neglect what was within
“ their reach, in order to grasp at objects far above their
“ comprehension ? He expressed his astonishment also,
“ that they did not discern the impossibility of man’s com-
“ prehending all those wonders, since the persons who had
“ the reputation of being most learned in such matters,
“ maintained opinions contradictory to each other, and
“ quarrelled like so many madmen. For as, among mad-
“ men, some are undaunted at the approach of the most
“ formidable calamities, and others terrified where there is
“ no appearance of danger ; so, among these philosophers,
“ some have maintained, that there is no action which
“ may not be performed in public, nor a word which may
“ not be freely spoken, in the presence of the whole world ;
“ while others, on the contrary, have taught, that all in-
“ tercourse with men ought to be avoided, and perpetual
“ solitude preferred to society : some have poured contempt
“ on temples and altars, and decried the worship of the
“ gods ; while others are such slaves to superstition, as to
“ adore wood, and stone, and irrational animals. And as
“ to the science of natural things, some have acknowledged
“ but one single being ; others have admitted an infinite
“ number : some insist, that all things are in a state of per-
“ petual motion ; others, that there is no such thing as
“ motion : some tell you, that the world is filled with in-
“ cessant generations and dissolutions ; and others, that
“ nothing is either generated or destroyed. He said fur-
“ ther, that he would be gladly informed by these sage per-
“ sonages, whether they entertained the hope of some day
“ or other reducing to practice what they taught, as per-
“ sons instructed in any art have it in their power to
“ exercise it at pleasure, either for their own private ad-
“ vantage, or for the benefit of their friends ; and whether
“ they imagined also, after they had discovered the causes

“ of every thing that exists, that they should be able from
“ the stores of their wisdom to dispense winds and rains,
“ and dispose of times and seasons, in subserviency to
“ their necessities ; or whether they meant to satisfy them-
“ selves with the bare knowledge of those things, without
“ the expectation of reaping from it any utility.”

Not that Socrates was unacquainted with nature ; on the contrary, he had studied her thoroughly ; but he had relinquished the investigation of causes, to apply himself to an admiration of their results. No one had ever collected more observations on this subject, and, in his conversations on divine providence, we find him frequently employing them.

Nature presents to us on every side, nothing but harmonies and adaptations to our necessities ; and we obstinately persist in vain efforts to trace the causes which she employs, as if we meant to wrest from her by force the secrets of her power. We do not so much as know the most common principles which she has placed in our hands, and under our feet. Earth, water, air, and fire are elements, we say. But under what form must earth appear, in order to be an element ? That stratum of matter called *humus*, which almost every where covers it, and which serves as a basis to the vegetable kingdom, is a refuse of all sorts of substances, of marl, of sand, of clay, of vegetables. Is it the sand which constitutes its elementary part ? But sand appears to be nothing more than a pulverization of the rock. Is it the rock, then, which is an element ? But the rock has the appearance, in its turn, of being an aggregation of sand, as may be observed in masses of the free-stone. Which of the two, sand or rock, has been the principle of the other, and took the precedence in the formation of the globe ? Supposing us informed as to this particular, what ground shall we have gained ? There are rocks formed of every kind of aggregation. Granite is composed of grains ;

marbles and calcareous stones, of the paste of shells and madrépores. There are likewise banks of sand composed of the wreck of all these stones: I have seen the sand of crystal. Shell-fishes, which seem to give us some light respecting the nature of calcareous stone, by no means indicate to us the primitive origin of that substance; for they themselves form their shells of the refuse that swims in the seas. The difficulties increase as we attempt to explain the formation of the innumerable bodies issuing out of the earth, and nourished by it. In vain do we call to our assistance analogies, assimulations, homogeneities, and heterogeneities. Is it not strange, that so many thousands of resinous, oily, elastic, soft, and combustible vegetables, should differ so entirely from the rugged and stony soil which produces them? The Siamese philosophers never embarrass themselves upon this subject, for they admit in nature a fifth element, which is wood. But this addition can carry them no great way; for it is still more astonishing, that animal substance should be formed of vegetable, than that this last should be formed of fossil. In what manner does this substance become sensible, living, and impassioned? I am aware of the plea, of the interposition of the action of the sun. But how is it possible that the sun should be the cause, in animals, of any moral affection, or, if you like the phrase better, of any passion, when we do not see it exercising a disposing influence even on the component parts of plants? For example, its general effect is to dry that which is humid. How happens it then, that, in a peach exposed to its action, the pulp without should be meltingly soft, and the nut within extremely hard, whereas the contrary takes place in the fruit of the cocoa tree, which is replenished with milk inwardly, and clothed externally with a shell as hard as a stone? Neither has the sun more influence on the mechanical construction of animals: their interior parts, which are most moistened with humours, with blood and

marrow, are frequently the hardest, such as the teeth and the bones; and the parts most exposed to the action of the sun are often very soft, as the hair, the plumage, the flesh, and the eyes. Again, how comes it to pass, that there is so little analogy between plants that are tender, ligneous, liable to putrefaction, and the earth which produces them? between the corals and madrépores of stone, which form banks so extensive between the tropics, and the sea water in which they are formed? To all appearance, the contrary ought to happen: the water ought to have produced soft plants, and the earth solid plants. If things exist thus, there must, undoubtedly, be many good reasons for it; I have a glimpse I think of one that is not without force: it is this, that if the analogies we are supposing actually took place, the two elements would shortly become uninhabitable; they would soon be overwhelmed by their own vegetation. The sea would be incapable of breaking madrepores of wood, and the air of dissolving forests of stone.

The same doubts might be employed respecting the nature of water. This element, you say, is formed of small globules, which roll one over the other; and to the spherical form of its elementary particles ought to be ascribed its fluidity. But if there are globules, there must be intervals and vacuities between them, without which they could not be susceptible of motion. How happens it, then, that water is incompressible? If you apply to it a strong compressing power in a tube, it will force its way through the pores of that tube, though the tube be of gold; and if of iron it will burst it. Employ what efforts you please, you will find it impossible to reduce it to a smaller size. And so far from knowing the form of its component parts, we cannot so much as determine that of the combined whole. Does it consist in being scattered into invisible vapours in the air, as the dew, or collected into mist in the clouds, or consolidated into masses in the ice, or finally, in a fluid state, as

in the rivers. Fluidity, it is said, is one of its principal characters. Yes, because we drink it in that state, and because, under this relation, it interests us the most. We determine its principal character, as we determine that of all the objects of nature, for the reason which I have already suggested, from our own most craving necessity: but this very character appears foreign to it; for it owes its fluidity only to the action of the heat; if you deprive it of this, it changes into ice. It would be a singular circumstance, after all our fundamental definitions, if it should appear that the natural state of water was to be solid, and the natural state of earth to be fluid: yet this must actually be the case, if water owes its fluidity only to heat, and if earth is nothing but an aggregation of sands united by different glues, and attracted to a common center, by the general action of gravity.

The elementary qualities of air, are not of less difficult determination. Air, we say, is an elastic body. When enclosed in grains of gunpowder, the action of fire dilates it to such a degree, as to communicate to it the power of hurling a globe of iron to a prodigious distance. But how, with all this elasticity, could it have been comprised into the grains of a crumbling powder? If you put even any liquid substance into a state of fermentation in a flask, a thousand times more air will be separated from it, than you could force into the vessel without breaking it. How could this air be confined in a substance soft and fluid, without disengaging itself by its own action?

Again, the air when loaded with vapours, we are told, is refrangible. The farther you advance to the north, the more elevated does the sun appear over the horizon, above the place which he actually occupies in the heavens. The Dutch mariners, who passed the winter of 1597 in Nova Zembla, after a night of several months, saw the sun re-appear fifteen days sooner than they expected his return.

All this is well. If the vapours, however, render the air refrangible, why is there no morning dawn, no evening twilight, nor any durable refraction of light whatever, between the tropics, not even on the sea, where the vapours are so abundantly exhaled, by the constant action of the sun, that the horizon is sometimes involved by them in a perfect mist?

The light, says another philosopher, is not refracted by the vapours, but by the cold; for the refraction of the atmosphere is not so great at the end of summer, as at the end of winter, nor at the autumnal equinox, as at the vernal. I admit the truth of this observation. After some hot days in summer there is refraction, however, to the north, as well as in our temperate climates, while between the tropics there is none: the cold, therefore, does not appear to me to be the mechanical cause of refraction, though it be the final cause of it. This admirable multiplication of light, which increases in the atmosphere in proportion to the intenseness of the cold, is, in my apprehension, a consequence of the same law which transmits the moon into the northern signs in proportion as the sun forsakes them, and which causes her to enlighten the long nights of our pole, while the sun is under the horizon; for light, be it of what sort it may, is warm. These wonderful harmonies are not in the nature of the elements, but in the will of him who has ordained them in subordination to the wants of beings endowed with sensibility.

Fire exhibits to us phenomena still more incomprehensible. Is fire, in the first place, matter? Matter, according to the definitions of philosophy, is that which divides itself into length, breadth and thickness. But fire is divisible only in perpendicular length; you never will divide a flame or a ray of the sun, in their horizontal breadth. Here then is matter divisible only in two dimensions. It has, beside, no gravity, for it continually

ascends; nor levity, for it descends, and penetrates bodies be they ever so deep. Fire, we are told, is contained in all bodies. Being of a consuming nature, how is it then that it does not devour them? And how can it remain in water without being extinguished? These, and other difficulties, induced Newton to believe that fire was not an element, but a certain subtile matter put in motion. Friction, it is true, and collision, elicit fire from several bodies. But how is it, that air and water, though agitated ever so violently, never catch fire? Nay, how is it that water even gets cold by motion, though its fluidity is entirely owing to its being impregnated by fire? Why, contrary to the nature of all other motions, does the motion of fire go on in a constant state of propagation, instead of meeting a check? All other bodies lose their motion by communicating it. If you strike several billiard balls with one, the motion is communicated to all, and is divided and lost. But a spark of fire disengages from a piece of wood the igneous particles, or the subtile matter if you will, which are contained in it, and the whole together increase their rapidity to such a degree, as to make one vast conflagration of a whole forest.

We are no better acquainted with what are called the negative qualities. Cold, they tell us, is occasioned by the absence of heat: but if cold be merely a negative quality, how is it capable of producing positive effects? If you put a bottle of frozen wine into water, as I have seen often practised in Russia, you will observe in a short time ice of an inch thick cover the outside of the bottle. A block of ice diffuses cold over its surrounding atmosphere. Yet darkness, which is a privation of light, diffuses no obscurity over surrounding light. If you open, in a fine day of summer, a grotto at once dark and cool, the surrounding light will not be in the least impaired by the darkness which it contained; while the heat of the adjacent air will

be perceptibly diminished by the cold air which issues from it. I am aware it will be said in reply, that if there be no perceptible obscuration in the first case, it is owing to the extreme rapidity of light, which displaces the darkness; but this, instead of removing would be increasing the difficulty, by supposing that darkness, too, has positive effects, which we have not time now to consider.

It is, however, on such pretended fundamental principles that most of our systems of physics are built. If we are in an error, or in a state of ignorance, at the point of departure, it cannot be long before we must necessarily go astray on the road; and it is really incredible with what facility, after having laid down principles so lightly, we content ourselves with vague terms and contradictory ideas, in the harvest of consequences which we reap from them.

I have seen, for example, the formation of thunder explained in physical publications of high celebrity. Some pretend that it is produced by the collision of two clouds; as if clouds or foggy vapours could ever produce a collision! Others tell you, that it is the effect of the air dilated by the sudden inflammation of the sulphurous and nitrous substances which float in the atmosphere. But, to be capable of producing such tremendous explosions, we must suppose the air to be confined in a body which made resistance. If you set fire to a large mass of gun-powder in a situation where it is not confined, no explosion follows. I know that the detonation of thunder has been imitated, in the experiment of fulminating powder; but the materials employed in the composition of that powder have a sort of tenacity. They undergo, on the part of the iron ladle which contains them, a resistance against which they sometimes act with so much violence as to perforate it. After all, to imitate a phenomenon is not to explain it. The other effects of thunder are explained with similar levity. As the air is found to be cooler after a thunder storm, the nitre, we are told, which is

diffused through the atmosphere, is the cause of it; but was not the nitre there before the explosion, when we were almost suffocated with heat? Does nitre cool only when it is set on fire? According to this mode of reasoning, our batteries of cannon ought to become glaciers in the midst of a battle, for, on such occasions, a world of nitre is kindled into flame; on the contrary, however, we are under the necessity of cooling the cannon with vinegar; for, having been fired off about twenty times in quick succession, it is impossible, from its heat, to apply your hand to it; the flame of the nitre, though instantaneous, powerfully penetrates the metal, notwithstanding its thickness and solidity. The heat, it is true, may likewise be occasioned by the interior vibration of the parts. Be this however as it may, the cooling of the air after a thunder storm, proceeds, in my opinion, from that stratum of frozen air which surrounds us, to the height of from twelve to fifteen hundred fathoms, and which, being divided and dilated at its base, by the fire of the stormy clouds, flows suddenly into our atmosphere. It is its motion which determines the fire of the thunder to direct itself, contrary to its nature, towards the earth; and it produces still farther effects, which neither time nor place will permit me at present to unfold.

It was affirmed, in the last age, that the earth was elongated at the poles; and we are now as positively told, that it is flattened there. I shall not at present enter into an examination of the principles from which this last conclusion has been deduced, or the observations on which it has been supported. The flattening of the earth at the poles has been accounted for from a centrifugal force, to which likewise its motion in the heavens has been ascribed, though this pretended force, which has increased the diameter of the earth at the equator, has not the power of raising so much as a straw into the air. But the flattening of the poles, they tell us, has been actually verified, by the measurement of

two terrestrial degrees, made at a vast expence, the one in Peru, near the equator, and the other in Lapland, bordering upon the polar circle.* These experiments were made, I grant, by men of great celebrity and learning. But persons of at least equal learning and celebrity, had demonstrated, upon other principles, and by other experiments, that the earth was lengthened at the poles. Cassini estimates at fifty leagues the length by which the axis of the earth exceeds its diameters, which gives to each of the poles twenty-five leagues of elevation over the circumference of the globe. We shall certainly enlist under the banner of this illustrious astronomer, if we consider the testimony of one of our senses as of any weight; for the shade of the earth appears to the eye oval over its poles, in central eclipses of the moon, as was observed by Tycho Brahé and Kepler; men whose names are in themselves equal to a host.

But, without considering names as of any authority where natural truths are concerned, we may infer from simple analogies the elongation of the axis of the earth. If we consider, as we said before, the two hemispheres as two mountains, whose bases are at the equator, and their summits at the poles, and the ocean, which alternately flows from one of these summits, as a great river descending from a mountain, we shall have, under this point of view, objects of comparison which may assist us in determining the point of elevation from which the ocean takes its rise, by the distance of the place where its course terminates. Thus the summit of Chimboraco, the most elevated of the Andes of Peru, out of which the river of the Amazons issues, having a league and one third nearly of elevation above the mouth of that river, which is distant from it, in a straight line, about twenty-six degrees, or six hundred and fifty

* It is evident, that the conclusion from those very measurements ought to have been, that the earth is lengthened at the poles. See the explanation of the plates at the end of Vol. III.

leagues, it may thence be concluded, that the summit of the poles must be elevated above the circumference of the earth nearly five leagues, in order to have a height proportioned to the course of the ocean, which extends as far as the line, ninety degrees distant, that is to say, two thousand, two hundred and fifty leagues, in a straight line.

If we farther consider, that the course of the ocean does not terminate at the line, but that, when it descends in summer from our pole, it extends beyond the Cape of Good Hope, as far as to the eastern extremities of Asia, where it forms the current known by the name of the westerly monsoon, which almost encompasses the globe under the equator, we shall be under the necessity of assigning to the pole, from which it takes its departure, an elevation proportioned to the course which it is destined to perform, and of tripling, at least, that elevation, in order to give its waters a sufficient declivity. I shall take it, then, at fifteen leagues: and if to this height we add that of the ices which are there accumulated, the enormous pyramids of which have frequently an elevation greater by one third than the heights of the icy mountains which support them, we shall find that the pole can hardly have an elevation less than the twenty-five leagues which Cassini assigned to it.

Obelisks of ice ten leagues high are not disproportioned to the center of cupolas of ice two thousand leagues in diameter, which, in winter, cover our northern hemisphere; and which likewise, in the southern hemisphere, in the month of February, that is, in the very midsummer of that hemisphere, have lofty borders, elevated like promontories, and three thousand leagues at least in circumference, according to the relation of Captain Cook, who coasted round them in the years 1773 and 1774.

The analogy which I establish between the two hemispheres of the earth, the poles, and the ocean which flows from them, and two mountains, their peaks, and the rivers

which have their sources there, is in the order of the harmonies of the globe, which exhibits a great number of similar harmonies, on a smaller scale, in the continents, and also in most islands, which are only continents in miniature.

It would appear, that philosophy has, in all ages, affected to find out very obscure causes, by which to explain the most common effects, with the view of attracting the admiration of the vulgar, who, in fact, scarcely ever admire any thing but what they do not comprehend. Availing itself of this weakness of mankind, it has taken care to unfold itself in a pomp of words, or in the mysteries of geometry, the better to carry on the deception. For how many ages did it cause to resound in our schools the horror of a vacuum, which it ascribed to nature? How many pretended demonstrations, wise above measure, have been given of this doctrine, which were to crown their authors with never-fading glory, but which are now buried in total oblivion? On the other hand, philosophy disdains to dwell on simple observations, which bring down to the level of every capacity the harmonies which unite all the kingdoms of nature. For example, the system of our own day refuses to the moon all influence both over vegetables and over animals: and yet it is certain, that the most considerable growth of plants takes place in the night; that there are several vegetables even which flower at no other time; that numerous classes of insects, birds, quadrupeds, and fishes, regulate their loves, their hunting, and their migrations, according to the different phases of the orb of night. But what of that? Shall philosophers degrade their wisdom to the experience of vulgar minds, and condescend to think and talk like gardeners and fishermen? If philosophy, however, denies the influence of the moon over the minuter objects of the earth, it makes ample amends, by conferring on this luminary a very extensive power over the globe at

large, without regarding the contradiction in which it thereby involves itself. It affirms, that the moon in passing over the ocean presses upon it, and thus occasions the flux of the tides on its shores. But how is it possible that the moon should compress our atmosphere, which, it is said, does not extend to twenty leagues, at most, from the surface of the earth? And even admitting that a subtile matter, possessed of great elasticity, should extend from our seas as far as to the moon, how could this matter be compressed by it, unless you suppose it confined in a channel? Must it not, in its actual state, extend to the right and to the left, while the action of the planet would find it impossible to make itself felt on any one determinate point in the whole circumference of our globe? Beside, why does not the moon act on lakes, and seas of small extent, where there are no tides? Their smallness ought no more to exempt them from the influence of her gravitation, than deprive them of the benefit of her light. Why are tides almost imperceptible in the Mediterranean? Why do they undergo in many places intermittent movements and retardations of two or three days? And lastly, why, towards the north, do they come from the north, the east, and the west, and not from the south, as was observed with surprise by Martens, Barents, Linschotten, and Ellis, who expected to see them come from the equator, as on the coasts of Europe.

The principal movements of the sea, it must be allowed, take place in our hemisphere at the same periods with the principal phases of the moon; but we ought not from thence to conclude their necessary dependance, and still less explain that dependance by laws which are not demonstrated. The currents and tides of the ocean proceed, as I think I have proved, from the effusion of the ices of the poles, which depend, in their turn, on the variety of the course of the sun, as he approaches more or less towards either pole: and

as the phases of the moon are themselves regulated by the course of this luminary, the reason is apparent why they both take place at the same time.

Farther, the moon when full, as we have already observed, has an effective and evaporating warmth : she must act, therefore, at such periods especially, on the polar ices.* The academy of sciences formerly maintained, that the light of the moon did not warm, from experiments made on her rays, and on the ball of a thermometer, with a burning mirror. But this is not the first error into which we have been betrayed by our books and our machinery, as we shall see when we come to speak of the decomposition of the solar ray by the prism. Neither is it the first time that an assembly of literati have adopted an opinion without examination, on the authority of persons who made experiments with much formality and parade. And thus it is that errors get into vogue. The error in question, however, has been completely refuted, first at Rome, and afterwards at Paris, by a very simple experiment. A vessel full of water was exposed to the light of the moon, and another similar to it placed in the shade ; and the water in the first vessel was observed to have evaporated much sooner than that in the second.

We may exert our ingenuity, and multiply our instruments as we please, we can seize in nature nothing but results and harmonies ; first principles universally escape us. But what is worst of all, the methods of our sciences have exercised a pernicious influence on our morals and on religion. It is easy to mislead men upon the subject of an intelligence which governs all things, when nothing is presented to them as first causes but mechanical means. But alas ! it is not by these that we shall find our way to

* This observation was made more than sixteen hundred years ago :—

“ The moon produces thaw, dissolving all ices and frosts by the humidity
“ of her influence.” Pliny’s Natural History, book ii. chap. ci.

that heaven, which we pretend so thoroughly to understand. The most distinguished of mankind have bent their thoughts and turned their eyes thither, as their last asylum. Cicero flattered himself with the hope of being, after death, an inhabitant of the stars; and Cæsar, of presiding, from the same elevation, over the destiny of Rome. An infinite number of other men have limited their future happiness to a superintendence of mausoleums, groves, fountains; and others to a re-union with the objects of their loves. But as for us, what are we hoping for either from earth or from heaven, where we see nothing but the levers of our pitiful machines? What, as the reward of our virtues, is our lot to be no better than this, to be confounded with the elements! What, is thy soul, O sublime Fenelon! to be exalted in inflammable air; and to have had on earth the sentiment of an order which did not exist even in the heavens! What, among those stars so luminous, is there nothing but material globes; and in their motions, so constant and so varied, nothing but blind attractions? How, every thing around us insensible matter; and intelligence given to man, who could give himself nothing, only to render him miserable! And can we have been deceived too, by the involuntary sentiment which makes us raise our eyes to heaven, in the agony of sorrow, there to solicit relief? The brute animal, on the point of closing his career, abandons himself to his natural instincts. The stag at bay seeks refuge in the most sequestered spot of the forests, content to yield up the roving spirit which animates him, under their hospitable shades. The dying bee forsakes the flowers, returns to expire at the door of her hive, and to bequeath her social instinct to her beloved republic. And man, following the bent of his reasoning powers, can he find nothing in the universe worthy of receiving his departing sighs, neither inconstant friends, nor selfish kindred, nor an ungrateful country, nor a soil

stubborn to all his labours, nor a heaven, indifferent to crimes and to virtue?

Ah! it is not thus that nature has apportioned her gifts. We bewilder ourselves with our vain sciences. By carrying the researches of our wisdom to the very principles of nature, and even of the Deity, we have stifled in the heart all feeling both of the one and the other. The same circumstance has befallen us which once befel a peasant who lived happily in a little valley in the heart of the Alps. A brook, which descended from those mountains, fertilized his garden. For a long time he adored in tranquillity the beneficent Naïad who supplied his stream continually with water, and increased its quantity and its coolness as the summer's heat increased. One day a fancy struck him, that he would go and discover the place where she concealed her inexhaustible urn. To prevent his wandering from the road, he begins with pursuing the track of his rivulet towards its source. By little and little he rises upon the mountain. Every step he takes, in ascending, discovers to him a thousand new objects, plains, forests, rivers, kingdoms, boundless oceans. Transported with delight, he proceeds in flattering hope of speedily reaching the abode where the gods preside over the destiny of the world. But, after a wearisome journey, he arrives at the bottom of a tremendous glacier. He no longer sees any thing around him but mists, rocks, torrents, and precipices. All, all has vanished; sweet and tranquil valley, humble roof, beneficent Naïad; and his patrimony is reduced to a cloud, and his divinity to an enormous mass of ice.

It is thus that science has conducted us through seductive paths, to a termination so fearful. She drags after her in the train of her ambitious researches, that ancient malediction pronounced against the first man who should dare to eat the fruit of her forbidden tree:—"Behold, the man is become as one of us, to know good and evil;" but he

shall not "take also of the tree of life, and eat, and live "for ever."* What troubles, literary, political, and religious, have our pretended science excited? How many beings has she prevented from living even a single day?

The sublime genius and pure spirit of Newton, undoubtedly, would not have stopped at this boundary of a vulgar mind. On observing the clouds resorting from every quarter to the mountains which separate Italy from the rest of Europe, he would have inferred the attraction of their summits, and the direction of their chains, conformably to the basons of the seas, and to the courses of the winds: he would thence have inferred similar dispositions respecting the different summits of the continent and of the islands: he would have seen the vapours rising out of the bottom of the seas of America, and conveying through the air fecundity to the center of Europe, fixing themselves in solid ice on the lofty pinnacles of the rocks, in order to cool the atmosphere of hot countries; undergoing new combinations, to produce new effects, and returning in a fluid state to their former shores, diffusing, in their mysterious progress, unlimited abundance in a thousand different channels. He would have observed with admiration the constant impulse communicated to so many various movements, by the action of one single luminary, the sun, placed at the distance of thirty-two millions of leagues; and, instead of fruitless rambling after the habitation of a Naiad, at the summit of the Alps, he would have prostrated himself before that God, whose providence embraces the concerns of a whole universe.

To study nature with understanding, all the parts must be taken together and viewed in their harmony and connexion. For myself, who do not pretend to be a Newton, I will not quit the borders of my rivulet; I will abide in

* Genesis, chap. iii. verse 22.

my humble valley, and will employ myself in culling its herbs and flowers, happy if I am able to form of them a few garlands to decorate the entrance of that rustic temple, which my feeble hands have presumed to rear to the majesty of nature !*

* The system of the harmonies of nature, which I am now about to unfold, is the only one, in my opinion, within the reach of man. It was first unveiled by Pythagoras of Samos, who was the father of philosophy, and the founder of the sect known by the name of the Pythagoreans. No philosophers have ever arisen so enlightened as were those sages in the natural sciences, and none whose discoveries reflect higher honour on the human understanding. There existed, at that time, different sects, who maintained that water, fire, air, atoms, were the principles of things. Pythagoras maintained, in opposition to those doctrines, that the principles of things were the adaptations and proportions of which the harmonies were composed, and that goodness and intelligence constituted the nature of God. He was the first who gave to the universe the epithet of world, because of its order. He affirmed that it was governed by a providence; a sentiment perfectly conformable to the tenor of our sacred books, and to experience. He invented the five zones, and the obliquity of the zodiac. He held that the torrid zone was habitable. He ascribed earthquakes to the water: and in fact, their focuses, as well as those of volcanos, as we have already indicated, are always in the vicinity of the sea, or of some great lake. He believed that each of the stars was a world, containing an earth, an atmosphere, and a heaven; and even in his time, this had been an anciently received opinion; for it is to be found in the verses of Orpheus. Lastly, he discovered the square of the hypothenuse, which has served as a basis to an infinite number of geometrical theorems and solutions. Philolaus, of Crotona, one of his disciples, maintained, that the sun received the fire diffused over the universe, and reverberated it, which affords a better explanation of his nature than the perpetual emanations of light and heat which we ascribe to him, without his wanting reparation, or experiencing diminution. He taught that comets were stars, which re-appeared after a certain revolution. Ecites, another Pythagorean, maintained the existence of two continents, that which we inhabit, and one opposite to it; an idea applicable only to America.

These philosophers believed, that the soul of man was a harmony composed of two parts, the one rational, the other irrational. They placed the first in the head, and the other round the heart. They contended for its immortality; and taught, that, at the death of the body, the soul returned to the soul of the universe. They approved of divination by dreams and augury, but condemned that which is performed by sacrifices; and thei

humanity was so great that they abstained from shedding the blood even of animals, and from eating their flesh. Nature rewarded their virtues, and the gentleness of their manners, by innumerable discoveries, and bestowed on them the glory of having as followers, Socrates, Plato, Archytas of Tarentum, who invented the screw, Xenophon, Epaminondas, who was educated by Lysis the Pythagorean, and the good king Numa, who taught the Tuscan Priests to conjure down the thunder: in a word, all that is valuable in philosophy, in literature, in the military art, and even in royalty itself, has been their portion.

Pythagoras has been calumniated, as having given encouragement to certain unmeaning superstitions, and among others abstinence from the use of beans. But, as truth is frequently obliged to present herself to men under a veil, this great philosopher conveyed to his disciples, under this allegory, an advice to abstain from public employments, because it was then the custom to make use of beans in voting at the election of magistrates. A very celebrated writer of modern times, who seems to look with an evil eye on every man of illustrious reputation, has also presumed to attack the character of Xenophon, in whom were united almost all the eminent qualities which can dignify human nature; piety, purity of manners, military virtue, and eloquence. His style is so sweetly harmonious, that the Greeks bestowed on him the appellation of the Athenian Bee. He has lately however been censured, on the ground of his celebrated retreat, by which he brought back ten thousand Greeks into their own country, from the very extremity of Persia, performing a march of eleven hundred leagues through a hostile country, and amidst foes innumerable.

The retreat of this renowned general, our learned critic pretends, was an effect of the benevolence or piety of Artaxerxes; and he has, in consequence, treated the route which Xenophon pursued, by the north of Persia, as a superfluous precaution. But is it credible that the king of Persia should show such indulgence to the Greeks, who had put to death in so perfidious and dastardly a manner twenty-five of their chiefs? How was it possible for those Greeks to have returned by the same road which they went, when every thing in this route had been put in motion to intercept them, and the Persians, through its whole extent, had destroyed the villages. By directing his march through a track of which they had no foresight, Xenophon defeated all their precautions. For my own part, I consider this military expedition as the most illustrious that ever was achieved; not only from innumerable conflicts, crossings of rivers, and forced marches over mountains, in the face of myriads of enemies, but because it was not sullied by a single act of injustice, and had no object in view but the preservation of the lives of his soldiers. The renowned warriors of antiquity have all considered the retreat of the ten thousand as a master-piece in the military art. There is an expression made use of by one of them, which will for ever cover it with glory, uttered, as it was, in an age,

and among a people, by which the science of war was carried to the height of perfection, and in a situation which admitted of no dissimulation: I mean an expression of Anthony, when entangled in the country of the Parthians. This General, who possessed great military talents, and had at that time the command of an army of a hundred and thirteen thousand men, of whom sixty thousand were Roman citizens, being obliged, as Xenophon was, to make a retreat in the face of the Parthians, and being twenty times on the point of failing in his attempt, frequently exclaimed, with a sigh, Oh, the ten thousand! (*See Plutarch.*)

STUDY X.

OF SOME GENERAL LAWS OF NATURE; AND, FIRST,
OF PHYSICAL LAWS.

WE shall divide these laws into physical and moral. We shall first examine some physical laws common to all the kingdoms of nature; and, in our next Study, shall make application of these laws to plants, agreeably to the plan we proposed at the commencement of our work. We shall, afterwards, proceed to the consideration of moral laws, and shall endeavour to unfold in these, as well as in the physical laws, the means of diminishing the ills of life.

I stand in need of every indulgence. I am entering upon a career that has hitherto been wholly unattempted. I dare not flatter myself with having penetrated far into its depths; but the imperfect materials which I have collected, may, perhaps, one day, assist men of greater ability, and in a happier situation, to raise a temple to nature more worthy of her. The reader will recollect, that all I promised of this temple were the frontispiece and ruins.

OF CONFORMITY.

Though conformity be a perception of our reason, I place it at the head of physical laws, because, in examining the objects of nature, it is the first feeling we seek to gratify. Nay, there is a connexion so intimate between the physical character of those objects, and the instinct of every being possessed of sensibility, that a colour, simply, is sufficient to rouse the passions of some animals. A red object puts the bull, for instance, into a rage, and suggests to most fowls and fishes the idea of prey. In man, the objects of nature exercise a feeling of a higher order, independent of his wants, which is that of conformity. It is by means of the multiplied conformities of nature, that man has formed his own reason; for reason means nothing more than the relation or conformity of things that exist. Thus, for example, if I examine a quadruped, the eye-lids, which it can raise or let fall at pleasure, present to me conformities with light; and in the shape of his feet, I see a conformity to the soil which he is destined to inhabit. It is impossible for me to conceive of these a determinate idea, without combining on the subject various feelings, either of conformity, or of the want of it. Even the most material objects, and such, so to speak, as have no decided form, cannot present themselves to us without these intellectual relations. A rustic grotto, or a steep rock, please or displease, according as they suggest to us the ideas of repose or of security, of perspective or of precipice.

Animals are sensible only relative to objects which have a particular conformity to their wants; and it may be affirmed, that, in this respect, they have a share of reason as perfect as our own. Had Newton been a bee, he could not, with all his geometry, have constructed his cell in a hive, without giving it, as the bee has done, six equal partitions. But

man differs from animals, in being able to extend this sentiment of conformity to all the relations of nature, however foreign they may be to his necessities ; and it is this extension of reason which has procured for him, by way of eminence, the denomination of a rational animal.

If all the particular rationalities of all animals were, indeed, united, the sum would probably exceed the general reason of man ; for human reason has devised most of its arts and crafts entirely from an imitation of their productions : beside that all animals come into the world with their particular industry ; whereas man is under the necessity of acquiring his at the expence of much time and reflexion, and by imitating, as I have just observed, the industry of another. But man excels them, not only by uniting in himself alone the intelligence scattered over them universally, but by his capability of ascending to the source of all conformities, namely, to God himself. In reality, the only character which essentially distinguishes him from other animals, is, that he is a religious being.

No animal partakes with him in this sublime faculty, which may be considered as the principle of human intelligence. It is by means of it, that he is exalted above the instinct of the beasts, so as to be enabled to form a conception of the general plans of nature, and to suppose an order of things, from having caught a glimpse of an author. It was by this faculty, he was emboldened to employ fire as the first agent in administering to his wants ; that he was led to cross the ocean, to give a new face to the earth by agriculture, to subject all animals to his empire, to establish society on the basis of religion, and to attempt to raise himself to the Deity by his virtues. It was not nature, as is commonly believed, which first pointed out God to man, but a sense of the Deity in man which indicated to him the order of nature. The savages are religious, long before they are naturalists.

Accordingly, by the sentiment of this universal conformity, man is struck with all possible conformities, though they may be foreign to him. The history of an insect interests him; and if his attention be not engaged in behalf of all the insects which surround him, it is because he does not perceive their relations, unless some Reaumur be at hand to display them to him; or else, the constant habit of seeing them renders them insipid, or some prejudice, odious and contemptible; for he is affected still more by moral than by physical ideas, and by his passions than by his reason.

We may remark too, that all the sentiments of conformity spring up in the heart of man at sight of some useful end, which, frequently, has no manner of relation to his own personal necessities: and hence it follows, that man is naturally good, for this very reason, that he is rational, since the aspect alone of a conformity, though entirely foreign to him, communicates a sense of pleasure. It is from this natural sentiment of goodness, that the sight of a well proportioned animal conveys to the mind agreeable sensations, which increase in proportion as the creature unfolds its instinct. We love to see a turtle, even in an aviary; but we are still more pleased with this bird when at large in the forest, uttering the murmurs of love from the top of an elm, or when we perceive it busily constructing there a nest for its young, with all the solicitude of parental tenderness.

It is also from a result of this natural goodness, that the want of conformity communicates a painful sensation, which always springs up at sight of any thing incongruous. Thus we are shocked at beholding a monster. To see an animal wanting a foot or an eye gives us pain. This feeling is independent of every idea of pain relatively to ourselves, let philosophers say what they will; for we suffer in such a case, though assured that the animal came into the world in that defective state. We are pained at the sight of incongruity even in insensible objects. Withered plants, muti-

lated trees, an ill assorted edifice, hurt our feelings. These sensations are natural to man, and are perverted in him only by prejudice, or by education.

OF ORDER.

A series of conformities, which have a common centre, constitutes order. There are conformities in the members of an animal; but order exists only in the body. Conformity relates to the detail, and order to the combination. Order extends our pleasure, by collecting a great number of conformities, and it fixes it, by giving to these conformities a determination to one center. It discovers to us at once, in a single object, a succession of particular conformities, and the principal conformity to which they all refer. Thus, order pleases us, as beings endowed with a reason which embraces all nature; and it pleases us still more, perhaps, as being weak and limited creatures, capable of taking in a single point only at a time.

It gives us pleasure, for example, to view the relations between the proboscis of a bee, and the nectareous juices of flowers; between the form of her thighs, hollowed into spoons, and bristled with hairs, and the fine powder of the stamina which she collects there; between her four wings, and the booty with which she is loaded, (a resource denied by nature to flies which travel without a burthen, and which, for this reason, are furnished with two wings only);* finally, the use of a long sting, which she has received for the defence of her property, and all the other conformities of the organs of this diminutive insect, which are more ingenious, and in much greater number, than those of the largest animals that exist. But the interest grows

* The ichneumon, or aquatic dragon fly, has, in like manner, four wings, because it was intended, like the bee, to fly under a load. I have seen it catch butterflies in the air.

upon us when we see her covered all over with a yellow powder, her thighs pendent, and half oppressed with her burden, directing her flight through the air, across plains, rivers, and shady groves, under points of the wind with which she is well acquainted, and alighting, with a humming sound, on the cavernous trunk of some aged oak. There we perceive another order, in the multitude of little individuals, similar to herself, which we observe coming out, and going in, according as the business of the hive may require : for the individual, whose particular conformities we have been admiring, is only a single member of a numerous republic ; and this republic itself but a small colony of the immense nation of bees, spread over the whole earth, from the line to the very shores of the frozen ocean. This nation, again, is subdivided into different species, conformably to the various species of flowers ; for there are some which, being destined to live upon flowers that have no depth, as the radiated, are armed with five hooks, to prevent their sliding on the petals. Others, on the contrary, such as the bees of America, have no stings, because they construct their hives in the trunks of prickly trees, which are very common in that part of the world, and serve effectually to protect them. Among the other species of bees there are other conformities with which we are totally unacquainted. Meanwhile, this vast nation, so varied in its colonies, and so extensive in its possessions, is but one little family of the class of flies, of which we know, in our own climate alone, near six thousand species, and most of them as distinct from each other, both as to forms and instincts, as bees themselves are distinct from other flies. Were we to compare the relations of this volatile class, so numerous in itself, with all the parts of the vegetable and animal kingdoms, we should find an innumerable multitude of other and different orders of conformity ; and were we to add to them, those which are presented to us in the legions

of butterflies, beetles, locusts, and other insects which likewise fly, we should multiply them to infinity. All this, still, would be but a small matter, compared to the various industry of the other insects which crawl, leap, swim, climb, walk, and are motionless, of which the number is incomparably greater than that of the insects which fly: and the history of both, when combined, would be the history, after all, of only one puny race of the great republic of the world, replenished as it is with innumerable shoals of fishes, and endless legions of quadrupeds, amphibious animals, and birds. All their classes, with their divisions, and subdivisions, of which the minutest individual presents a very extensive sphere of conformities, are themselves only particular conformities, rays and points merely in the general sphere, of which man alone occupies the centre, and has a glimpse of its immensity.

From a sense of this general order, two other sentiments take their rise, the one throwing us imperceptibly into the bosom of the Deity, and the other recalling us to the perception of our wants; the one exhibiting to us, as the first cause, a being infinitely intelligent, out of ourselves, and the other, as the ultimate end, a very limited being, in our own person. These two sentiments characterize the two powers, spiritual and corporeal, of which man is constituted. This is not the place to unfold them: it is sufficient for my purpose to remark, that these two natural sentiments are the general sources of the pleasure which is afforded by the order of nature. Animals are affected only by the second of these senses, the corporeal one, and that in a very limited degree.

A bee has a sentiment of the order of her hive; but she knows nothing beyond it. She is totally ignorant of the order which regulates the ants in their nest, though she has frequently seen them prosecuting their labours. To no purpose would she resort, in consequence of her hive being

destroyed, to seek refuge, as a republican, in the midst of their republic. To no purpose, in the hour of distress, would she attempt to avail herself of the qualities which she possesses in common with these insects, and which make communities flourish, as temperance, a disposition to industry, the love of country, and, above all, that of equality, united to superior talents: she would experience from them no hospitality, no consideration, no compassion. She would even not find an asylum among other bees of a different species: for every species has its proper sphere assigned it, and this by an effect of the wisdom of nature; for otherwise, the best organized species, or the strongest, would expel the weaker from their domains. Hence it follows, that the society of animals could not subsist independent of the passions, nor human society independent of the virtues. Man alone, of all animals, possesses the sentiment of universal order, which is that of the Deity himself; and, by carrying with him over the whole earth, the virtues which are the fruits of this sentiment, whatever differences prejudice may interpose between man and man, he is sure of alluring all hearts to himself. It was by this sentiment of universal order which governed their lives, that Aristides, Socrates, Marcus Aurelius, the divine Fenelon, and the unfortunate Rousseau, have become the idols of all nations, and that they continue to interest us still, even when we are no longer blessed with their presence.

OF HARMONY.

Nature opposes beings to each other, in order to produce between them conformities. This law has been acknowledged from the highest antiquity. It is to be found in many passages of the Holy Scriptures. The following is from the book of Ecclesiasticus: *—*Omnia duplicia, unum*

* Ecclesiasticus, chap. xlii. ver. 24. 25.

contra unum, et non fecit quidquam deesse;—"All things are
"double, one against another; and he hath made nothing
"imperfect: one thing establisheth the good of another."

I consider this great truth as the key of all philosophy. It has been fruitful also in discovery, like that other truth, "Nothing has been created in vain." It is the source of taste in the arts and in eloquence. Out of contraries arise the pleasures of the eye, of the ear, of the touch, of the taste, and all the attractions of beauty, of whatever kind or degree. But from contraries likewise arise ugliness, discord, and all the sensations which fill us with disgust. How wonderful, that nature should employ the same causes to produce so different effects! When she opposes contraries to each other, painful emotions are excited in us; and when she blends them, agreeable emotions. From the opposition of contraries springs discord, and from their union results harmony.

Let us look into nature for some proofs of this great law. Cold is opposed to heat, light to darkness, earth to water; and the harmony of these contrary elements produces the most delightful effects: but if cold succeed rapidly to heat, or heat to cold, the majority of vegetables and animals, exposed to such sudden evolutions, are in danger of perishing. The light of the sun is pleasant; but if a black cloud intercept the lustre of his rays, or a quick flame, such as that of lightning, burst from the bosom of an obscure sky, the eye experiences, in both these cases, a painful sensation. If the tremendous explosions be interrupted by intervals of profound silence, the horror of a thunder storm is increased; and if the oppositions of those celestial fires and obscurities, of that tumult and tranquillity, make themselves felt in the gloom and silence of night, it is heightened inexpressibly.

Nature opposes, in like manner, at sea, the white foam of the billows to the black colour of the rocks, to announce

to the mariners from afar the danger of shallows. She frequently presents to them forms analogous to destruction, such as those of ferocious animals, of edifices in ruins, or of the keels of ships turned upward. She causes even hollow noises to issue from these forms, resembling groans, and broken off by long intervals of silence. The ancients believed that they saw in the rock of Scylla, a hideous female, whose girdle was surrounded by a pack of dogs that were always barking: while to the rocks of the Bahama channel, so noted for shipwrecks, our mariners have given the name of *the Martyrs*, because, through the spray of the billows which break upon them, they present the horrid spectacle of men impaled and exposed on wheels. You would even imagine, that you heard sighs and sobbings issuing from these dismal shallows.

Nature employs, in like manner, these clashing oppositions, and ominous signs, to express the characters of savage and dangerous animals of all kinds. The lion, strolling by night through the solitudes of Africa, announces his approach from a distance by roarings, which have a striking resemblance to the rolling of thunder; while the vivid and instantaneous flashes of fire which dart from his eyes, in the dark, exhibit the formidable appearance of lightning. During the winter, the howlings of the wolves in the forests of the north, resemble the whistling of the winds as they agitate the trees; the cries of birds of prey, too, are shrill, piercing, and now and then interrupted by hollow moans. There are some even which emit the sounds of a human being in agony. Such is the lom, a species of sea-fowl, which, on the shelvy coast of Lapland,* feeds on the dead bodies of animals which are there driven ashore; it cries like a man a-drowning. Noxious insects exhibit the same oppositions, and the same signals of destruction,

* See John Schæffer's History of Lapland.

The gnat, thirsting after human blood, announces himself to the eye by the white points with which his brown coloured body is studded, and to the ear, by his shrill notes, which disturb the tranquillity of the grove. The carnivorous wasp is speckled, like the tiger, with black stripes on a yellow ground. We frequently find in our gardens, about the roots of trees which are decaying, a species of bug, of a longish form, which bears on its red body marbled with black, the mask of a death's head. Finally, the insects which more immediately attack our persons, however small they may be, distinguish themselves by glaring oppositions of colour to the field on which they settle.

But when two contraries of any kind happen to be blended, the combination produces pleasure, beauty, and harmony. The instant and point of their union I call *harmonic expression*. This is the only principle which I have been able to perceive in nature ; for the elements themselves are not simple, as we have seen ; they always present accords, formed of two contraries, to analyses, multiplied without end. Thus, to resume some of the instances which we formerly adduced, the gentlest temperatures, and the most favourable, in general, to every species of vegetation, are those of the seasons in which cold is blended with heat, as in the spring and in autumn. They then occasion two saps in trees, which the strongest heats of summer do not effect. The most agreeable results of light and darkness also are produced at those periods when they melt into each other, and form what painters call the clear-obscure and half lights. It is for this reason, that the most interesting hours of the day are those of morning and evening, when, in the beautiful imagery of La Fontaine, in his charming fable of Pyramus and Thisbe, the shade and the light strive for the mastery in the azure fields of the heavens. The most lovely prospects are those in which land and water are lost in each other, which suggested the observation to the ex-

cellent Plutarch, that the pleasantest land journies are those which we make by the sea-side, and the most delightful voyages, those in which we coast along the land. These same harmonies will be found also to result from savours and sounds the most opposite, in the pleasures of the palate and of the ear.

But let us proceed to examine the constant uniformity of this law, in the very principles themselves by which nature gives us the first sensations of her works, which are colours, forms, and motions.

OF COLOURS.

I shall be particularly careful not to define colours, and equally so, at least, not to explain their origin. Naturalists tell us, that they are the refractions of light on bodies, as is demonstrated, they pretend, by the prism, which, by breaking a ray of the sun, decomposes it into seven coloured rays, which display themselves in the following order, red, orange, yellow, green, blue, indigo, and violet. These, according to them, are the seven primitive colours. Upon the subject, however, of what is primitive in nature, we are, in my opinion, perfectly ignorant. To their statement it might be objected, that, if the colours of objects are produced only from the refraction of the light of the sun, they ought to disappear by the light of a taper, for the light of a taper is not decomposed by the prism: but waving this, I shall confine my reflections to the number and order of those supposed colours.

It is evident, in the first place, that four of them are compound colours; for orange is made up of yellow and red; and indigo is nothing more than a tint of blue surcharged with black. This reduces the solar colours to three primordial ones, yellow, red, and blue; to which if we add white, which is the colour of light, and black,

which is the privation of it, we shall have five simple colours, with which may be compounded all their imaginable shades.

It may be remarked, that our philosophical machines, with their parade of wisdom, deceive us doubly, not only by ascribing false elements to nature, as when the prism, for instance, displays compound for primitive colours, but by stripping her of such as are true; for how many white and black bodies must be reckoned colourless, because, forsooth, this same prism, in the decomposition of the solar ray, does not exhibit their tints?

This instrument leads us into a farther error respecting the natural order of these said colours, by making the red ray the first in the series, and the violet ray the last. The order of colours in the prism, then, is only a triangular decomposition of a ray of cylindrical light, of which the two extremes, red and violet, participate of each other, without terminating it; so that the principle of colours, which is the white ray and its progressive decomposition, is no longer manifested in it. I am very much inclined to believe, that it is even possible to cut a crystal with such a number of angles, as would give to the refractions of the solar ray an order totally different, and multiply the pretended primitive colours far beyond the number of seven: and if the algebraists were but to apply to this polyedron of mine a few calculations, somewhat obscure, with a seasoning of the ratiocination of the corpuscular philosophy, as they have done with regard to the effects of their triangular instrument, its authority would become equally respectable with that of the prism.

We shall employ however a method, not quite so learned, to convey an idea of the generation of colours, and of the decomposition of the solar ray. Instead of examining them in a prism of glass, we shall consider them in the heavens, and we shall there see the five primordial colours

unfold themselves in the order which we have indicated above.

In a fine summer's night, when the sky is serene, and loaded only with some light vapours, sufficient to obstruct and to refract the rays of the sun as they traverse the extremities of our atmosphere, place yourself on an open plain, where the first fires of Aurora may be perceptible, and you will observe the horizon to whiten first at the spot where this goddess is to make her appearance; and this kind of radiance, from its colour, has obtained, in the French language, the name of *aube*, (*dawn*) from the Latin word *alba*, which signifies white. This whiteness ascends insensibly in the heavens, and assumes, a few degrees above the horizon, a tint of yellow; the yellow, as it rises a few degrees higher, passes into orange, and the orange, rising higher still, into a lively vermilion, which extends as far as the zenith. From the zenith, again, you will perceive behind you in the heavens, the violet succeeding the vermilion, then the azure, then the deep blue or indigo colour, and, last of all, the black quite to the west.

Though this developement of colours presents an infinite multitude of intermediate shades, succeeding each other with considerable rapidity, there is a moment, and, if my memory be accurate, it is the moment when the sun is just going to exhibit his disk, that the dazzling white is visible in the horizon, the pure yellow at an elevation of forty-five degrees, the fire colour in the zenith, the pure blue forty-five degrees under it, westward, and in the west itself the dark veil of night still lingering on the horizon: at least I have remarked, I think, this progression between the tropics, where there is scarcely any horizontal refraction to make the light, as in our climates, prematurely incroach on the darkness. Rousseau one day observed to me, that though the field of those celestial colours be blue, the yellow tints which blend themselves with it, do not produce

by this mixture the colour of green, as, in our material colours, is always the case when these two shades are blended. But I replied, that I had frequently perceived green in the heavens, not only between the tropics, but over the horizon of Paris. This colour, indeed, is scarcely ever seen in our climate, but in some fine evenings in summer. I have observed too, in the clouds of the tropics, particularly at sea, and in stormy weather, all the colours that are perceptible on the earth. I have seen, at such periods, among those clouds, some of the colour of copper, others like that of tobacco smoke issuing from a pipe, others brown, reddish, black, gray, chesnut, livid, and others of the colour of flame proceeding from the mouth of a heated oven. And as to those which appear there in fine weather, some are so lively and brilliant, that no palace, though enriched with all the gems of the Great Mogul, can exhibit any thing at all equal to them. Sometimes, by means of the trade winds from the north-east, or south-east, which constantly blow there; these clouds are carded through each other, like so many tufts of silk; then swept away to the west, crossed and recrossed over one another, like the oziers interwoven in a transparent basket. The clouds not employed in the texture, and which are by no means few in number, those winds throw over the sides of this checkered work; they roll them up into enormous masses, white as snow, draw them out along their extremities in form of a crupper, and pile them upon each other, like the Cordeliers of Peru, moulding them into the shape of mountains, of caverns, and of rocks; afterwards, as evening approaches, they abate a little of their violence, as if afraid of deranging their own workmanship. When the sun comes to set behind this magnificent netting, you see a multitude of luminous rays transmitted through the interstices, which produce such an effect, that the two sides of each interstice illuminated by them, have the appearance of being begirt

with a fillet of gold, and the other two, which are in the shade, of being tinged with a superb carnation. Four or five divergent streams of light, emanating from the setting sun, and extending to the zenith, skirt with fringes of gold the undeterminate summits of this celestial barrier, and proceed to strike with the reflexes of their fires the pyramids of the collateral aerial mountains, which then appear to consist of silver and vermilion. Then it is that you perceive, amidst their redoubled ridges, a multitude of vallies, extending into infinity, and distinguishing themselves, at their opening, by shades of flesh, or of rose-colour. These vallies present, in the different contours, inimitable tints of white melting into white, or shades lengthening themselves out, without mixing, over other shades; while here and there, issuing from the cavernous sides of the mountains, streams of light are observed precipitating themselves, in ingots of gold and silver, over rocks of coral. In one place it is a gloomy rock, pierced through and through, and disclosing, beyond the aperture, the pure azure of the firmament; and in another, an extensive strand, poppy-coloured, scarlet, and green as the emerald, stretching over the rich ground of heaven, and besprinkled with sands of gold. The reverberation of these western colours diffuses itself over the sea, whose azure billows it glazes with saffron and purple. The mariners, leaning over the gunwale of the ship, admire in silence these aerial landscapes. Sometimes this sublime spectacle presents itself to them at the hour of prayer, and seems to invite them to lift up their hearts with their voices to the heavens. It changes its appearance every instant: what was just now luminous, becomes the next moment scarcely coloured, and what is now coloured, will, by and by, be in the shade. The forms are as variable as the shades; they are, by turns, islands, hamlets, hills clothed with the palm tree, vast bridges stretching over rivers, fields of gold, of amethysts, of rubies, or rather, nothing of all

this—celestial colours and forms, which no pencil can pretend to imitate, and no language is able to describe.

It is very remarkable, that all travellers who, at various seasons, have ascended to the summits of the highest mountains on the globe, between and beyond the tropics, in the heart of the continent and in islands, could never perceive, in the clouds below them, any thing but a gray and lead-coloured surface, without any variation whatever as to colour, and always similar to that of a lake. The sun, notwithstanding, illuminated those clouds with his whole light, and his rays might there combine, without obstruction, all the laws of refraction to which our systems of physics have subjected them. From this observation it follows, and I shall repeat it in another place, because of its importance, that there is not a single shade of colour employed in vain, through the whole extent of the universe; that those celestial decorations were made for the level of the earth, and that their magnificent point of view is taken from the habitation of man.

These admirable concerts of lights and forms, which manifest themselves only in the lower and least illuminated region of the clouds, are produced by laws with which I am totally unacquainted. But, be their variety ever so great, they are all reducible to five colours: the yellow appears to be a generation from white; the red a deeper shade of yellow; the blue a deeper tint of red; and the black the extreme tint of blue. If you observe the expansion of light in the heavens, early in the morning, as I before mentioned, you will find it impossible to doubt of this progression; you will then see five colours, with their intermediate shades, generating each other nearly in this order: white, sulphur-yellow, lemon-yellow, yolk-of-egg-yellow, orange, aurora-colour, poppy-red, full-red, carmine-red, purple, violet, azure, indigo, and black. Each of these colours seems to be only a strong tint of that which precedes, and a faint one of

that which follows it ; and the whole together only modulations of a progression, of which white is the first term, and black the last.

In this order, where the two extremes, white and black, that is, light and darkness, produce, in harmonizing, so many different colours, you will remark, that red holds the middle place, a colour, which, in the judgment almost of all nations, is the most beautiful of the whole. The Russians, when they would describe a beautiful girl, say she is red. They call her *crasna devitsa*, red and beautiful being with them synonymous terms. In Mexico and Peru, red was held in the highest estimation. The most magnificent present which the emperor Montezuma could devise for Cortez, was a necklace of lobsters, which, of course, had that rich colour.* The only demand made upon the Spaniards by the king of Sumatra, when, on their first landing in his country, they presented him with various specimens of the commerce and industry of Europe, was some corals and scarlet coloured stuffs;† and he promised, in return, to give them all the spices and other merchandize of India, for which they might have occasion. It is by means only of such stuffs that we can carry on trade to any advantage with the Negroes, the Tartars, the Americans, and the natives of India. The testimonies of travellers, respecting the preference every where given to this colour are unanimous. But for the fear of being tedious, I could produce proofs innumerable of this. My view, in exhibiting the universality of this taste, is merely to show how false is the philosophic axiom which asserts, that tastes are arbitrary, or, which amounts to the same thing, that there are in nature no laws for beauty, and that our tastes are the effects of prejudice. On the contrary it is prejudice that corrupts our natural tastes, which would otherwise be the same over the whole earth. For instance, it is prejudice which leads the

* See Herrera. † See General History of Voyages by the Abbe Prevost.

Turks to prefer green to every other colour, because, according to the tradition of their theologians, this was the favourite colour of Mahomet; and his descendants alone, of all the Turks, have the privilege of wearing the green Turban. It is prejudice again which leads the Persians, their neighbours, on the contrary, to despise green, because they reject the traditions of these Turkish theologians, and, being followers of Ali, do not acknowledge this consanguinity of their prophet. From another chimera, the most distinguished colour to the Chinese is yellow, because it is that of their emblematical dragon. Accordingly yellow is in China the imperial colour, as green is in Turkey. If we may depend however on the testimony of Isbrant-Ides, the Chinese, notwithstanding, represent their gods and heroes on the stage, with their faces stained the colour of blood.* All these nations, the political colour excepted, consider red as the most beautiful, which is sufficient to establish, with respect to it, an unanimity of preference.

But, without dwelling longer on the variable testimony of man, let us appeal only to that of nature. It is with red that nature heightens the most brilliant parts of the most beautiful flowers. The rose, which is the queen of the garden, she clothes entirely with it. In animals she has bestowed this tint on the blood, which is the principle of life. She invests, in India, most of the feathered race with a plumage of this hue, especially in the season of love, when there is hardly a bird, indeed, that does not in some degree or other partake of its lustre. Some have their heads covered with it, such as those which are called cardinals; others have a breast-plate of it, a necklace, a capuchin, a shoulder-knot. There are some which preserve entirely the gray or brown ground of their plumage, but which is glazed over with red, as if they had been rolled

* Journey from Moscow to China, page 141.

in carmine. Others are as regularly sprinkled with it as if you had blown over them a scarlet powder, and have a mixture, beside, of small white points, which produce a most charming effect. A little bird of India, in particular, called Bengali, is painted in this manner. But the most lovely bird of all is a turtle dove of Africa, that bears on her pearl-gray plumage, precisely over the heart, a bloody spot, consisting of several kinds of red blended together, and resembling a wound; as if, dedicated to love, she was destined to wear her master's livery, and had actually served as a mark to his arrows. What is still more wonderful, as soon as the season of love is over, these rich coralline tints, in most of these birds, totally disappear, as if they were robes of ceremony, lent them by the benevolence of nature only during the celebration of their nuptials.

The red, situated in the midst of the five primordial colours, constitutes, by way of excellence, their harmonic expression, and is the result, as has been said, of the union of two contraries, light and darkness. There are other tints extremely agreeable, compounded of the oppositions of other extremes. For example, from yellow and blue, the second and fourth colour, green is derived, which forms a very delightful harmony, and ought, perhaps, to possess, among colours, the second rank in beauty, as it possesses the second in their generation. Nay, green appears, in the eyes of many persons, if not the most beautiful tint, at least the most pleasant, because, being less dazzling than red, it is more congenial to the eye.*

* It is harmony that renders every thing perceptible, as it is monotony that makes every thing disappear. Not only are colours the harmonic consonances of light; but there is no coloured body whatever, of which nature does not heighten the tint by the contrast of the two extreme generative colours, which are white and black. Each body detaches itself by means of light and shade, of which the first is a-kin to the white, and the second to the black: accordingly, each bears upon it a complete harmony.

The other harmonic shades, which may be deduced, in conformity to the laws of their generation, from colours the most opposite, and of which might be formed accords and concerts, similar to what Father Castel produced from his celebrated harpsichord, I have no time to insist upon. I must, however, remark, that colours may have a powerful influence on the passions, and may be referred, as well as their harmonies, to the moral affections. For example, making red the point of departure, which is the distinguishing harmonic colour, and proceeding towards white in

This is not the effect of chance. Were we enlightened, for example, by a luminous air, we should not perceive the form of bodies; because their outlines, their profiles, and their cavities, would be overspread with an uniform light, which would cause their prominent and retreating parts to disappear. With a providence, therefore, completely adapted to the weakness of our vision, the author of nature has made the light to issue from a single point of heaven; and with an intelligence that equally challenges our admiration, he has given a motion of progression to the sun, who is the source of that light, in order to form, with the shades, harmonies varying every instant. He has also modified that light on terrestrial objects, in a manner that it illuminates both immediately and mediately, by refraction and by reflection, and extends its tints, and its harmonies, with those of shade, in a way that no words can express.

Talking one day with Rousseau, he made this observation: "Painters can give the appearance of a body in relief to a smooth surface; but I would fain see them give the appearance of a smooth surface to a raised body." I made no reply at the moment; but having since reflected on the solution of this problem in optics, I by no means consider it as impossible. Nothing would be necessary, according to my idea, but to destroy one of the harmonic extremes by which bodies are rendered prominent. For instance, if the object aimed at were to flatten a bas-relief, the cavities would require to be painted white, or the prominent parts black. Accordingly, as painters employ the harmony of the clare-obscur, to give the appearance of a raised body to a plane surface, they might employ the monotony of a single tint, to make what is actually raised disappear, and become to the eye a plane surface. In the first case, they render that visible which is not tangible, and in the second, we should have a body that might be touched without being visible; a species of magic which would be no less surprising than the other.

an ascending progression, the nearer you approach this first term, the more lively and gay are the colours. You will have in succession the poppy, the orange, the yellow, the lemon, the sulphur, the white. On the contrary, if you proceed from red towards black, the colours will become by degrees more sad and lugubrious, for the progression will be this: purple, violet, blue, indigo, and black. In the harmonies which may be formed, on both sides, by the union of opposite colours, the more the tints of the ascending progression predominate, the more lively will be the harmonies produced; and in proportion as the colours of the descending harmony shall prevail, the contrary will take place. It is from this harmonic effect that green, being compounded of yellow and blue, is so much the more gay accordingly as the yellow predominates, and so much the more sad in proportion as the blue has the ascendancy. It is from the same influence also, that white transuses most gaiety into all other tints, because it is light itself. Nay, it produces, from opposition, a most delightful effect even in the harmonies which I call melancholy; for, blended with violet, it gives the delicious hue of the lilac, with blue, azure, and with black, a pearl gray; while melted into red, it exhibits the rose-colour, that enchanting tint which is the flower of life. On the other hand, if black prevail in colours which are gay, the result is more gloomy than before, when the black remained by itself, pure and unmixed. This will appear by blending it with yellow, orange, and red, which are thereby rendered dull and depressing. Red gives life to every tint into which it is infused, as white communicates gaiety, and black sadness.

To produce effects directly the reverse of those I have been indicating, all we have to do is, to place the extreme colours close to each other, without mingling them. The most mournful and the harshest effect is produced by black

contrasted with white. With nations in general, their opposition is a badge of mourning, just as, in the tempestuous appearances of the heavens, and in the commotions of the ocean, it is the signal of impending destruction. The yellow, too, opposed to black, is the characteristic of many dangerous animals, as the wasp, the tyger, and others. I would by no means insinuate, that women have not the skill of employing to advantage, in their dress, these opposite colours; but they are used by them as an embellishment, solely on account of the contrasts which they form with the colour of their complexion; and as the red predominates there, it follows that those opposite colours are advantageous in this respect, for harmonic expression is never stronger than when found between the two extremes which produce it. But we shall speak again of this part of harmony, when we treat of contrasts, and of the human figure.

Meanwhile, it is not to be dissembled, that against the universality of these principles several objections may be started. We have represented white as a gay, and black as a depressing colour: yet, with certain Negro nations, the Devil is represented as white; and the inhabitants of the peninsula of India, in token of mourning, rub their forehead and temples with the powder of sandal-wood, of which the colour is a yellowish-white. The navigator, La Barbinos, who, in his voyage round the world, has described the manners of China with as much accuracy as he has done those of our own sea-officers, and of several European colonies, says also, that white is the colour of mourning among the Chinese. From these instances it might be concluded, that the feeling of colour, not being the same in all nations, must be arbitrary.

To these objections I shall make the following reply. We have elsewhere shewn, that the nations of Africa and Asia, however black they may be themselves, prefer, in

theri amours, white women to those of every other tint. If some Negro nations paint the Devil white, this may be easily accounted for, from the strong feeling of tyranny which the whites exercise over them. White, accordingly, having become with them a political colour, ceases to be a natural one. Beside, the white in which they paint their devil is not a white beautifully harmonious, like that of the human figure; but a dead or chalk-white, such as that with which our painters illuminate the figures of phantoms and ghosts, in their magical and infernal scenes. And if this dazzling colour be the expression of mourning among the Indians and Chinese, it is because of its dissonance with the black skin of these nations. The complexion of the Indians is black; that of the southern Chinese considerably sun-burnt. It is from India, the cradle of the human race, and the land of blacks, that they derive their religion and their leading customs. Their outward garments are all gloomy; a great part of their dress is of black satin, and the covering for their under extremities black boots. The ornamental furniture of their houses also, is of the same description, and consists, chiefly, of that beautiful black varnished ware, which we import from their country. White must accordingly produce, with their furniture, their dress, and above all, with the dusky colour of their skin, a harsh and offensive contrariety. Were these nations to wear, for mourning, a black dress, as we do, let their complexion be ever so deep, there would appear no clashing opposition. Accordingly, the expression of grief with them is precisely the same as with us. For, if we, in a season of mourning, oppose the black colour of our clothes to the white colour of our skin, in order thence to produce a funereal dissonance, the southern nations oppose, on the contrary, the white colour of their garments to the dusky colour of their skin, to produce the same effect.

By this variety of taste, the universality of the principles which we have laid down respecting the causes of harmony and dissonance is strikingly confirmed. It demonstrates, too, that the agreeableness or disagreeableness of a colour does not reside in a single shade, but in the harmony, or in the clashing contrast, of two opposite colours.

We might find in nature proofs of these laws multiplied without end; and it is to nature man should always have recourse in all his doubts. She gives a repulsive dissonance to the colours of dangerous and destructive animals, in hot countries as in cold. Venomous reptiles she every where paints in a murderous apparel, and birds of prey in an earthy hue, opposed to yellow, or else with white specks on a dark ground, or dark specks on a light one. She has given a yellow robe, striped with dusky-brown, and sparkling eyes, to the tyger lying in ambush under the shade of the forests of the south; and she has tinged with black the snout and paws, and with blood-colour the throat and eyes of the white bear, thereby to render him apparent, notwithstanding the whiteness of his fur, amidst the snows of the north. But leaving colours, let us proceed to the generation

OF FORMS.

To me it appears, that the principles of these, like the principles of colours are reducible to five; namely, the line, the triangle, the circle, the ellipse, and the parabola.

The line generates all forms, as the ray of light generates all colours. Like the other, too, it goes on progressively in its generations, step by step, producing at first, by three fractions, the triangle, which of all figures contains the least surface under the greatest circumference. The triangle afterwards, composed itself of three triangles, at the centre,

produces the square, which has four triangles, the pentagon, which has five, the hexagon, which has six, and so of the rest of the polygons, to the circle itself, which is composed of a multitude of triangles, of which the summits are at its centre, and the bases at its circumference, and which, contrary to the triangle, contains the greatest surface under the smallest periphery. The form which, hitherto, commencing with the line, has been going on progressively to the circle, from one centre, afterwards deviates from it, and produces the ellipse, then the parabola, and finally all the other widened curves, the equations of which may all be referred to this last.

Accordingly, under this view, the indefinite line has no common centre: the triangle has three points in its bounding lines, which have a common centre; the square in like manner, four points; the pentagon, five; the hexagon, six; and the circle has a single and common centre to all the points of its circumference. The ellipse begins to deviate from this regulation, and has two centres; and the parabola, as well as the other curves which are analogous to it, have centres innumerable contained in their several axes, from which they remove farther and farther, forming, as it were, so many funnels.

On the supposition of this ascending generation of forms, from the line through the triangle, up to the circle, and their descending generation from the circle, through the ellipse, to the parabola, I deduce, from these five elementary forms, all the forms of nature; in the same manner as with the five primordial colours I compose all the possible shades of colour.

The line presents the slenderest form, the circle the fullest, and the parabola the most sloping and hollowed (*évidée*). In this progression it may be remarked, that the circle, which occupies the middle between these two extremes, is the most beautiful of all the elementary forms, as

red is the most beautiful of all the primordial colours. I will not affirm, with certain ancient philosophers, that this form must necessarily be the most beautiful, because it is the figure of the stars, which, however, would be no very contemptible reason; but, employing only the testimony of our senses, will observe, that it is the most grateful both to the eye and the touch; that it is the most susceptible of motion; and, finally, what is no mean authority in the case of natural truths, that it is considered as the most conformable to the taste of all nations, who introduce it into their ornaments, and their architecture, and particularly to the taste of children, who give it the preference over every other, in the instruments of their amusement.

It is very remarkable, that these five elementary forms should bear the same analogies to each other, as do the five primordial colours; so that if you proceed, on the one hand, to their ascending generation, from the sphere to the line, you will have forms angular, lively, and gay, terminating in the straight line, of which nature composes those numerous radiations and expansions of figure, in the heavens and on the earth, which are so pleasant to behold; and if you descend, on the other hand, from the sphere to the excavations of the parabola, you will have a gradation of cavernous forms, similar to those which are so frightful in abysses and precipices.

If, again, you join the elementary forms to the primordial colours, term for term, you will observe their principal character mutually strengthening each other, at least in the two extremes, and in the harmonic expression of the centre: for the two first terms will give the white ray, which is the ray of light itself; the circular form, united to the red colour, will produce a figure analogous to the rose, composed of spherical portions, with carmine tints, and esteemed, from the effect of this double harmony, in the judgment of all nations, the most beautiful of the productions of Flora;

while, lastly, by black, added to the vacuity of the parabola, the gloom of retreating and cavernous forms will be increased.

With these five elementary forms may be composed figures as agreeable as the shades which are produced from the harmonies of the five primordial colours. So that the more the two ascending terms of the progression shall prevail in these mixed figures, the more light and gay will such figures appear; and the more the two descending ones shall predominate, the more heavy and dull will be the forms. Thus, the most elegant form will be that in which the first term, or the straight line, shall have the greatest predominance. For example, the column gives us pleasure, because it is a long cylinder, which has the circle for its basis, and two straight lines, or a quadrilateral figure of considerable length, for its elevation. But the palm tree, of which it is an imitation, pleases us still more, because the stellated and radiating forms of its palms, likewise taken from the straight line, constitute a very agreeable opposition with the roundness of its stem; and if, to this, you join the harmonic form by way of excellence, namely, the circular form, you will add to the grace of this beautiful tree a charm beyond the power of expression. This, accordingly, is what nature, who knows much more of the matter than we do, has actually done, by suspending, at the basis of its divergent boughs, sometimes the oval date, and sometimes the rounded cocoa nut.

In general, as often as you employ the circular form, you will greatly enhance its agreeableness, by uniting in it the two contraries of which it is composed; for you will then have a complete elementary progression. The circular form alone presents but one expression, the most beautiful of all, in reality; but, united to its two extremes, it forms, if I may so express myself, an entire thought. It is in consequence of the effect resulting from this union, that the

form of the heart is considered by the vulgar to be so beautiful that every other beautiful and interesting object is compared with it: for, as beautiful as a heart, is a saying that we hear every where. This form of the heart consists of a projecting angle, at its basis, and above of a retreating angle; so that here we have the extremes: and in its collateral parts, of two spherical portions, where again we have the harmonic expression.

It is, likewise, from these same harmonies, that long ridges of mountains, overtopped by lofty peaks of a pyramidal form, and separated from each other by deep vallies, so delight us by their gracefulness and majesty. If you subjoin rivers meandering below, radiating poplars waving on their banks, flocks of cattle and shepherds, you will have vales similar to that of Tempe. In this landscape the circular forms of the mountains will be found placed between their extremes, that is between the prominency of the rocks and the cavity of the vallies. But if you separate from it the harmonic expressions, namely, the circular wavings of those mountains, together with their peaceful inhabitants, and allow the extremes only to remain, you will then have the dreary prospect of Cape Horn, of angular and perpendicular rocks, hanging over fathomless abysses; and if you add oppositions of colour, as that of snow on the summits of the dusky rocks, the foam of the billows breaking on the lurid shore, a pale sun in a gloomy sky, torrents of rain in the midst of summer, tremendous squalls of wind succeeded by sullen calms, a European vessel, on her way to spread desolation over the islands of the South Sea, running upon a rock at the entrance of night, firing, at intervals, the signals of distress, of which the noise is reverberated by the echos of those horrid deserts, and lastly, the terrified Patagonians running in amazement to their caves—you will have a complete view of that land of desolation, covered with the shades of death.

OF MOVEMENTS.

It remains for me to suggest a few reflections on the subject of motions. Of these we shall, in like manner, distinguish five, which are fundamental: self motion, or the rotation of a body round itself, which supposes no change of place, which is the principle of all motion, and of which, perhaps, that of the sun is an instance; then the perpendicular, the circular, the horizontal, and lastly the state of rest. All movements whatever may be referred to these five. You may even remark, that geometricians, who represent them also by figures, suppose the circular motion to be generated by the perpendicular and the horizontal, and, to make use of their language, to be produced by the diagonal of their squares.

I shall not insist on the analogies of the generation of colours and forms, to those of the generation of movements, and which actually exist, between the white colour, the straight line, and self motion or rotation; between the red colour, the spherical form, and circular motion; between darkness, vacuity, and rest: neither shall I develop the infinite combinations which may result from the union, or opposition, of the corresponding terms of each generation, and of the filiations of these same terms; but shall leave to the reader the pleasure of following this idea, and of forming to himself, with these elements of nature, harmonies the most enchanting, with the additional charm of novelty; and shall confine myself, at present, to a few hasty observations respecting motions in general.

Of all movements, the harmonic, or circular, is the most agreeable. Nature has diffused it over most of her works, and has rendered even the vegetables, which are rooted to the earth, susceptible of it. Our plains exhibit frequent images of this, when the winds form, in our meadows, or

our corn-fields, a series of undulations, resembling the waves of the sea ; or when they gently agitate, on the sides of lofty mountains, the towering tops of the trees, waving them about in segments of a circle. Most birds, too, form portions of great circles as they wanton in the airy expanse, and seem to delight in tracing, as they fly, an infinite variety of curves and spiral motions. It is remarkable that nature has bestowed this agreeable flight on the most inoffensive species of the feathered race, on such species as are to be prized neither for the exquisiteness of their song nor the richness of their plumage, as the swallow, for instance.

In the progressive movements of ferocious or noxious animals, on the contrary, the case is different. They advance leaping, springing, and join to movements sometimes extremely slow, others remarkably rapid ; which may be observed in the cat lying in wait for a mouse, or a tyger in his approaches upon his prey, which are exactly similar. In the flight of carnivorous birds there prevails the same discordancy. The species of owl, called the grand-duke, floats through a tranquil sky, as if the wind carried him this way and that, as it listed. Tempests too, present in the heavens similar characters of destruction. Sometimes you perceive the clouds moving in opposite directions and with various degrees of velocity ; some flying with the rapidity of lightning, while others remain immoveable as the rock. In the tremendous hurricanes of the West Indies, the explosion is always both preceded and followed by a dead calm.

The more of self-motion, or of rotation, a body possesses, the more agreeable it appears, especially when to this movement is united the harmonic or circular motion. It is for this reason, that trees whose leaves are extremely moveable, such as the aspen and poplar, have more grace, when agitated by the wind, than other trees. They please the eye by the balancing of their tops, and by presenting,

in turns, the two surfaces of their foliage, which display two different greens; and they are agreeable likewise to the ear, from their imitation of the distant noise of water. It is from the quality they possess of self-motion, every moral idea out of the question, that animals interest us more than vegetables.

In my opinion, there is not a spot on the earth in which there will not be found some one or more bodies in motion. I have frequently been in the midst of vast solitudes, both by day and by night, and in seasons of perfect tranquillity, and some noise or other has always struck upon my ear. Often, indeed, it was the sound only of a bird on the wing, or of an insect stirring a leaf; but sound universally supposes motion.

Motion is the expression of life, and therefore it is that nature has multiplied the causes of it in all her works. One of the great charms of a landscape is the sight of objects in motion: a charm, however, which the pictures of most of our great masters frequently fail to express; for, if you except those which are descriptive of tempests, you will find, every where else, their forests and meadows motionless, and the water of their lakes as still as if it were congealed. Meanwhile, the inversion of the leaves of trees, exhibiting a gray or white underside, the undulations of the grass in the vallies and on the ridges of the mountains, the smooth expanse of the waters somewhat ruffled, and the foam which whitens the shores, recal, with inexpressible pleasure, in a burning scene of summer, the breath, so gentle and so refreshing, of the zephyrs. To these might be added, with infinite grace, and with powerful effect, the movements peculiar to the animals which inhabit such scenes; for example, the concentric circles which the diving bird forms on the surface of the water; the flight of a sea fowl taking its departure from a hillock, with its neck advanced, and its legs thrown backwards; that of two white turtles skimming

side by side, in the shade, along the skirts of a forest, and the balancing of a wagtail on the extremity of the foliage of a rush, that bends under the burthen. The motion and weight of a loaded carriage toiling up hill might also be represented, by expressing the dust of the crushed pebbles which rises behind its wheels; and even, in my opinion, the singing of birds, and the reverberation of the echoes, by means of certain characters which it is not here necessary to unfold. But so far are most of our painters, even among those whose talents are the greatest, from paying attention to these agreeable accessories, that they often omit them in subjects where they constitute, in reality, the principal character of the piece. For example, they suppose a chariot in full speed, and they take care to exhibit every spoke of the wheels. The horses, it is true are galloping, but the chariot is motionless. The wheels of a carriage, however, when running with rapidity, present a single surface only to the eye, all their spokes being apparently confounded. It was not thus that our masters in every branch of art, the ancients, imitated nature. Pliny tells us, that Apelles painted his chariots with four horses so accurately, that the wheels appeared to be turning round. In the curious list which he has transmitted to us of the most celebrated pictures of antiquity, and which, in his time, were still viewed at Rome with admiration, he mentions one in particular of women spinning wool, in which the spindles seemed actually to whirl; and in another again, held in high estimation,* “are two light armed soldiers in battle, “of whom one is so heated with running, that you see him “sweat, and the other, who is laying down his arms, appears so exhausted, that you hear him, as it were, panting “for breath.” I have seen, in various modern pictures, machines in motion, and wrestlers and warriors in action, but they have always been deficient in the effects I am speaking

* Pliny's Natural History, book xxxvii. chap. 10 and 11.

of, simple as are such effects, and expressive of the truth of nature. Our painters consider them as petty details, which it is unworthy of a man of genius to notice: and yet these petty details are traits of character.

Marcus Aurelius, who had certainly as much genius as any of our moderns, has very judiciously observed, that, in many cases, it is upon such minutenesses the mind fixes its attention and delights to dwell. "The shrivelling appearance of ripe figs," says he, "the bushy eye-brows of a lion, the foaming of an enraged wild boar, the reddish scales which rise on the crust of bread, as it comes out of the oven, never fail to give us pleasure." This pleasure may be accounted for in various ways: first, from the weakness of the mind, which, in contemplating an object, fixes always on some individual and principal point; and next, from the design of nature, who, in all her works, presents to us, likewise, one single point, either of conformity, or of dissonance, which appears, as it were, to be its centre. In proportion as this characteristic trait is simple, and, seemingly contemptible, the more is the affection or aversion of the mind increased respecting it. It is for this reason that, in eloquence, the most concise expressions always depict the strongest passions; for, as we have seen, all that is requisite, in order to excite a pleasing or painful sensation, is to determine a point of harmony, or of discord, between two contraries: but if these contraries, opposites in nature, are also opposites as to magnitude and weakness, the contrariety is redoubled, and consequently the effect. In such instances, when we observe striking occasions of hope, or fear, resulting from objects of apparently small importance, surprise, especially, lays hold of the mind; for every physical effect produces, in man, a moral feeling. I have seen, for example, many pictures, and read many descriptions, of battles, in which it was attempted to inspire horror, by representing an infinite variety of instruments of

destruction, and a multitude of dying and dead persons, wounded in every possible manner. But the more machinery I perceived employed to move me, the less did I feel myself moved, one effect destroying the other: whereas, by reading, in Plutarch, the death of Cleopatra, my mind has been greatly affected.

By this great painter of calamity, the queen of Egypt is represented meditating, in the tomb of Anthony, on the means of eluding the triumph of Augustus. By permission of the guards placed at the entrance of the tomb, a peasant brings her a basket of figs. The moment he has retired, she hastens to uncover the basket, and perceives the asp, which she had contrived should be introduced among the figs, in order to put a period to her miserable existence. This contrast in a woman, of liberty and slavery, of royal power and annihilation, of voluptuousness and death; those leaves and fruits, in the midst of which she perceives only the head and sparkling eyes of a puny reptile, prepared to terminate interests of such great moment, and the exclamation—*There you are!* which she utters immediately on perceiving it, all these oppositions, one after another, make us shudder. But to render the person itself of Cleopatra interesting, there is no occasion that we should represent to ourselves, as our painters and sculptors exhibit her, as an academic figure, destitute of expression, a strapping virago, robust, and full of health, with large eyes turned towards heaven, and wearing round her brawny arm a serpent twisted like a bracelet. This is by no means a representation of the little, voluptuous queen of Egypt, at one time, packed up in a bundle of goods, and carried on the shoulders of Apollodorus, to keep a stolen assignation with Julius Cæsar; at another, walking the streets of Alexandria, by night, with Anthony, disguised as a sempstress, rallying him upon his jests, and telling him how they smelt of the soldier. Still less is it a representation of the unfor-

fortunate Cleopatra, reduced to the extreme of misery, striving, with cords and chains, and assisted by two of her women, to draw to the window of the monument in which she had taken refuge, with her head bent downward, but without once letting go her hold, says Plutarch, that very Anthony, covered with blood, who had run himself through with his own sword, and who exerted his little remaining strength to assist her efforts, and expire in her arms.

Details are by no means to be despised; they are frequently traits of character. To return to our painters and sculptors: while they withhold from landscapes, wrestlers, and chariots in the course, the expression of motion, they bestow it on the portraits and statues of our great men, in abundance. They represent them as so many angels sounding the alarm to judgment, their hair dishevelled, their eyes wandering, the muscles of the face in a state of convulsion, and their garments fluttering in the wind. These, they tell us, are the expressions of genius. Are men of genius, then, Bedlamites? I have seen portraits of such men on antiques. I have seen the medals of Virgil, of Plato, of Scipio, of Epiminondas, and even of Alexander; and these exalted characters were all represented with a serene and tranquil air. To obey all the movements of nature, is the property of brute bodies, of vegetables, and mere animals only; but it is that of a great man, in my opinion, to have his emotions under controul; and it is only inasmuch as he exercises this empire, that the name of great can belong to him.

I have made this short digression from my subject, in order to suggest to artists a few lessons of conformity, of which the execution, I am well aware, is much more difficult than it is easy for me to criticise. God forbid, however, that any thing I have said upon the subject should give a moment's pain to men, whose works have frequently afforded me such exquisite pleasure. My wish was simply

to caution them against the academic manner by which they are fettered, and to stimulate them to tread in the steps of nature, and to pursue their course in this career as far as their exalted genius can carry them.

This would naturally be the place to speak of music, for sounds are merely movements : but, fortunately, persons of much greater ability have already investigated this noble art with consummate skill. If any foreign testimony, however, could farther confirm me in the certainty of the principles which I have hitherto laid down, it is that of the ablest musicians, who have restricted harmonic expression to three sounds. In the same manner also, I might have reduced to three terms, the elementary generations of colours, forms, and motions ; but it appears to me, that those musicians have omitted, in their fundamental basis, the generative principle, which is sound properly so called, and the negative term, which is silence ; since this last, especially, produces effects so powerful in the movements of music.

These proportions might further be extended to the savours of tasting, and it might be demonstrated, that the most agreeable of those impressions on the palate, have similar generations ; as we know, by experience, to be the case with regard to most fruits, whose different stages of maturity successively present five savours, acid, sweet, sugary, vinous and bitter. They are acid while growing, sweet as they ripen, sugary in a state of perfect maturity, vinous in their fermentation, and in a state of dryness bitter. We should also find, that the most agreeable of those savours, namely, the sugary, is that which occupies the middle place in this progression, of which it is the harmonic term, and that, from its very nature, it forms new harmonies, by a combination with its extremes ; for the beverages which are most grateful, consist of acid and sugar, as the refreshing liquors prepared with citron juice ; or of sugar and bitter, as coffee. But while I am endeavouring to open new paths to

philosophy, it is no part of my intention to present new combinations to voluptuousness.

Though I have myself a thorough conviction of the truth of those elementary generations, and am able to support them with a multitude of proofs, which I have collected, both in the tastes of polished and savage nations, but which time does not permit me, at present, to exhibit; it would, however, be a matter of no surprize to me, if many of my readers were to withhold their approbation, and refuse to agree with me. Our natural tastes are perverted from our infancy by prejudices, which determine our physical sensations much more powerfully than these last give direction to our moral affections. More than one churchman considers violet as the most beautiful colour, because it is worn by his bishop: more than one bishop, in their turn, give scarlet the preference, because it is the cardinal's colour; and more than one cardinal, undoubtedly, would rather be dressed in white, because white is appropriated to the head of the church. A soldier, again, frequently looks upon the red as the most beautiful of all ribbons, while his superior officer prefers the blue. Our temperaments also influence our opinions, in the same manner as do our conditions in life. Persons of a gay disposition prefer lively colours; persons of sensibility, those which are delicate; while the grave and melancholy assume the darker hues. Though I myself consider red as the most beautiful colour, and the sphere as the most perfect form, and though I am bound more than any other individual strenuously to adhere to this order, because it is the order of my system, yet I prefer to the full red, the carmine, which has a slight shade of violet; and to the sphere, the oval, or elliptical form: and it appears to me, if I may venture to say so, that nature has bestowed on the rose, by way of preference, both these modifications, at least before it is completely expanded. I prefer violet flowers to white, and still more to yellow. I

prefer a branch of lilach in bloom to a pot of gilly-flowers, and a Chinese daisy, with its disk of a smoky yellow, its rumpled shaggy down, its violet and grave petals, to the brightest cluster of sun-flowers in the Luxemburg. I am persuaded, that I have these tastes in common with many other persons; and that, if we form a judgment of men from the colour of their clothes, a greater number will be found of a grave than of a gay character: I am likewise of opinion, that nature, for to her we must ever have recourse in order to be assured that we are right, gives to most of her physical beauties a tendency to melancholy. The plaintive notes of the nightingale, the deep shades of the forest, the sober lustre of the moon, inspire no gaiety, yet they do not fail to interest us. I feel more emotion in contemplating the setting than the rising sun. In general, we are pleased by gay and sprightly beauties, but the soul is touched and melted only by those which are melancholy. In another place, I shall endeavour to unfold the causes of these moral affections. They belong to laws of a more sublime nature than any physical laws: physical laws amuse our senses, but these speak to the heart, and admonish us that man is ordained to a higher and nobler destination.

I may be mistaken in the order of those generations, and may have transposed their terms. But all that I proposed from the beginning was to open some new paths into the study of nature. If the effect of those generations be generally acknowledged, my purpose is answered. Men better enlightened will establish the filiations of them in a more luminous order. All that I have hitherto said on this subject, or may say hereafter, is reducible to this grand law: that every thing in nature is formed of contraries; that from their harmonies results the sentiment of pleasure, from their oppositions the sentiment of pain.

This law, as we shall prove, extends also to morals. Every truth, the truths of fact excepted, is the result of two con-

trary ideas. Hence it follows, that, as often as we decompose a truth, by dialectics, we divide it into the two ideas of which it is constituted; and if we confine ourselves to one of its elementary ideas, as to a detached principle, and deduce consequences from it, we shall convert it into a source of endless disputation; for the other elementary idea will not fail to supply consequences, to the person who is disposed to pursue them, diametrically opposite; and these consequences are themselves susceptible of contradictory decompositions, which go on without end. The schools are admirably adapted to instruct us in this process; and thither it is that we are sent to form our judgment. They teach us to separate the most evident truths, not only into two, but, as Hudibras says, into four. If, for example, some one of our logicians, observing that cold had an influence on vegetation, should think proper to maintain, that cold is the only cause of vegetation, and that heat is even inimical to it, he would take care to cite the efflorescences and the vegetations of ice, the growth, the verdure, and the flowering of mosses in winter, plants burnt up by the heat of the sun in summer, and many other effects relative to his thesis. But his antagonist, availing himself, on his side, of the influences of spring and the ravages of winter, would not fail clearly to demonstrate, that heat alone gives life to the vegetable world. But the truth is, after all, that heat and cold form together one of the principles of vegetation, not only in temperate climates, but in every intermediate degree, to the very heart of the torrid zone itself.

It may be affirmed, that all the disorders, both in physics and morals, are neither more nor less than the clashing opposition of two contraries. If men would pay attention to this law, their wranglings and mistakes, for the most part, would speedily be at an end; for it may be urged, that, every thing being composed of contraries, whoever affirms

a simple proposition, is only half right, since the contrary proposition has equally an existence in nature.

There is, perhaps, in the world but one intellectual truth, pure, simple, and that does not admit of a contrary idea; which is the existence of God. It is remarkable, that those who have denied it, adduce in support of their negation no other proofs but the apparent disorders of nature, of which they contemplated alone the extreme principles; so that they have not demonstrated, that no God existed, but that he was not intelligent, or that he was not good. Their error accordingly proceeds from their ignorance of natural laws. Beside, their arguments have been founded, for the most part, on the disorders of men, who exist in an order widely different from that of nature, and who alone, of all beings endowed with perception, have been committed to their own direction.

As to the nature of God, I know that faith itself presents him to us, as the harmonic principle by way of supreme excellence, not only with relation to all that surrounds him, of which he is the creator and mover, but even in his essence divided into three persons. Bossuet has extended these harmonies of Deity to man, by tracing in the operations of the human soul, certain consonancy to the Trinity, of which it is the image. Such lofty speculations, I confess, are infinitely above my reach. I am astonished even that the Divinity has permitted beings so weak and so transitory as we are, to take so much as a glimpse of his omnipotence on the earth, and that he should have veiled, under combinations of matter, the operations of his infinite intelligence, thereby to adapt it to our perception. A single act of his will was sufficient to call us into being, the slightest communication of his works, to illuminate our reason; but, were the smallest ray of his divine essence to be communicated directly to us, in a human body, the consequence

would be, I am persuaded, that we should instantly be annihilated.

OF CONSONANCES.

Consonances are repetitions of the same harmonies. They increase our pleasures by multiplying them, and by transferring their enjoyment to new scenes. They please us also by shewing that the same intelligence must have presided in all the different plans of nature, since there are every where presented to us similar harmonies. Consonances, accordingly, confer more pleasure than simple harmonies, because they impress us with the sentiment of extension, as well as of divinity, so congenial to the nature of the soul. Physical objects excite a certain satisfaction, only by developing in us an intellectual feeling.

Frequent examples of consonances are observable in nature. The clouds of the horizon often imitate, on the sea, the forms of mountains, and the aspects of land, and that with so much accuracy, as sometimes to deceive the most experienced mariners. The waters reflect, in their inconstant bosom, the heavens, the hills, and the forests. The echoing rocks, repeat, in their turn, the murmuring of the waters. One day, as I was walking in the *Païs de Caux*, along the sea side, and considering the reflections of the shore in the water, I heard other waves emitting a dying sound behind me. Astonished at the circumstance I turned round, and perceived only a high and steep shore, of which the echos were repeating the noise of the waves. This double consonance was extremely agreeable. You would have supposed there had been a mountain in the sea, and a sea in the mountain.

These transpositions of harmony, from one element to another, communicate inexpressible delight. Nature has accordingly multiplied them, not only by means of fugitive

images, but by permanent forms. She has repeated, in the midst of the seas, the forms of continents in the forms of islands, of which the majority, as we have seen, have peaks, mountains, lakes, rivers, and plains, proportioned to their extent, as if they were of themselves so many worlds in miniature. On the other hand, she represents in the midst of the land, the basons of the vast ocean, in mediterraneans, and in great lakes, which have their shores, their rocks, their isles, their volcanos, their currents, and, sometimes, their flux and reflux, occasioned by the effusions from icy mountains, at the basis of which they are commonly situated, as the currents and tides of the ocean are by those of the poles.

It is remarkable, that the most beautiful harmonies are those which have the most consonances. Nothing in the world, for example, is more beautiful than the sun, and nothing in nature is so frequently repeated as his form and his light. He is reflected in a thousand different ways, first by the refractions of the air, which every day exhibit him above all the horizons of the globe, before he is actually risen, and for some time after he has set; next by the parhelia which reflect his disk, sometimes twice or thrice, in the misty clouds of the north; then by the rainy clouds, in which his refracted rays trace an arch, shaded with a thousand various colours; and again by the waters, the reflections of which exhibit him in an infinite number of places where he is not, in the bosom of meadows, amidst flowers besprinkled with dew, and in the shade of the green forests. The dull and inert earth, too, reflects him in the specular particles of sand, of micas, of crystals, and of rocks. It presents to us the form of his disk, and of his rays, in the disks and petals of the myriads of radiated flowers with which it is covered. In a word, this beautiful star has multiplied himself to infinity, and with varieties of which we know nothing, in the innumerable stars of the firmament,

which he discovers to us, as soon as he quits our horizon ; as if he withdrew from the consonances of the earth, only to display to the delighted eye the consonances of heaven.

From this law of consonance it follows, that what is best and most beautiful in nature, is likewise most common and the oftenest repeated. To this law we must ascribe the varieties of species in each genus, which are the more numerous in proportion as the genus is useful. For example, there is no family in the vegetable kingdom so necessary as that of the gramineous, on which subsist not only all the quadrupeds, but endless tribes of birds and insects ; and there is, accordingly, no other of which the species are so varied. In the Study on plants we shall notice the reasons of this variety ; and shall content ourselves with remarking here, that it is in the gramineous families man has found that great diversity of nutritious grains, from which he derives his chief subsistence ; and that, from reasons of consonance, not only the species, but several of the genera, nearly approach each other, thereby to present similar services to man, under latitudes entirely different. Thus, the millet of Africa, the maize of Brazil, the rice of Asia, the palm sago of the Moluccas, of which the trunks are filled with alimentary flower, are in consonance with the corn of Europe. We shall find consonances of another kind in the same places, as if it had been the intention of nature to multiply her benefits, by varying only their form, without changing, as to their qualities, hardly any thing. Thus, in our gardens, what a pleasing and beneficial consonancy is observable between the orange tree and the citron, the apple and the pear, the walnut and the filbert ; and in our farm yards, between the horse and the ass, the goose and the duck, the cow and the she goat ?

Each genus again is in consonancy with itself, from difference of sex. There are indeed, between the sexes, con-

trasts which give to their loves the greatest energy, by means of the very opposition of contraries, from which, as we have seen, all harmony takes its rise. Yet, notwithstanding this circumstance, without the general consonancy of form existing between them, sensitive beings of the same genus would never have approached each other; one sex would have for ever remained a stranger to the other. Before each of them could have observed what the other possessed that corresponded to its necessities, the time of love would have been absorbed by that of reflection, and all desire, perhaps, have been extinguished. It is consonancy which attracts, and contrast which unites them. I do not believe that, in any genus whatever, there is to be found an animal of the one sex entirely different in exterior forms from one of the other; and if such differences, as certain naturalists pretend, actually exist, in several species of fishes and insects, I am persuaded, that the habitation of male and female were placed by nature close to each other, and their nuptial couch at no great distance from their cradle.

But there is a consonancy of forms much more intimate still than even that of the two sexes, I mean the duplicity of organs observable in each individual. Every animal is double. When we consider his two eyes, his two nostrils, his two ears, the number of his legs and arms disposed by pairs, we might almost say, here are two animals glued the one to the other, and united under the same skin. Even the parts of his body which are single, as the head, the tail, and the tongue, appear to be formed of two halves, compacted together by seams. This is not the case with the members properly so called, taken individually: for example, a hand, an ear, an eye, cannot be divided into two similar halves; but the duplicity of form in the parts of the body, distinguishes them essentially from the members; for the parts of the body are bipartite, and the members are simple; the former are always single, and the

latter always in pairs. Thus, the head and the tail of an animal are parts of its body, and the legs and ears of it are members.

This law of nature, one of the most wonderful, and one, at the same time, which is the least observed, is sufficient to destroy, of itself, all the hypotheses which would introduce chance into the organization of beings; for, independently of the harmonies which it presents, it doubles at once the proofs of a providence, which did not deem it sufficient to give one principal organ to each animal, adapted to each element in particular, such as the eye for the light of the sun, the ear for the sounds of the air, the foot for the ground which is to support it: but determined, beside, that he should have each of those organs in pairs.

Certain sages have considered this admirable duplication as a pre-disposition of providence, in order that the animal might have a substitute always at hand, to supply the loss of the double organs, exposed as they are to so many accidents: but it is remarkable, that the interior parts of the body, which, at first sight, appear to be single, present, on close examination, a similar duplicity of forms, even in the human body itself, where they are more confounded than in other animals. Thus the five lobules of the lungs, of which one has a kind of division; the fissure of the liver; the separation of the brain above by the reduplication of the *duramater*; the *septum lucidum*, similar to a leaf of talc, which separates the two anterior ventricles of it; the two ventricles of the heart; and the divisions of the other viscera, announce this double union, and seem to indicate, that *the very principle of life, is the consonance of two similar harmonies.**

* Each organ is itself in opposition with the element for which it is destined; so that from their mutual opposition arises a harmony which constitutes the pleasure enjoyed by that organ. This is very remarkable, and confirms the principles which we have laid down. Thus the organ of vision, adapted

From this duplicity of organs, there farther results a utility much more extensive than if they had been single. By the assistance of two eyes, man can take in, at once, more than half of the horizon; whereas, with a single one, he could scarcely have embraced a third part of it. Provided with two arms, he can perform an infinite number of actions, which with one only he could never have accomplished; such as raising upon his head a load of considerable size and weight, and climbing a tree. If placed upon one leg, his position would not only be much more unsteady than upon two, but he would be unable to walk; his progressive motion would be reduced to crawling, or else to hopping, a mode entirely discordant to the constitution of the other parts of the body, and to the variety of soils over which he is destined to move.

If nature has given to brute animals a single exterior organ, as the tail, it is because the use of it, being extremely limited, extends but to a single action to which it is perfectly adequate. The tail too, from its situation, is secured against almost every danger; while, again, hardly any but very powerful animals have a long one, as bulls, horses, and lions. In rabbits and hares it is extremely short; and in those feeble animals, in which it is of considerable length,

principally to the sun, is a body singularly opposite to the sun, for it is almost entirely aqueous. The sun emits luminous rays; the eye, on the contrary, is surrounded by a dusky eye-brow which overshadows it. The eye, beside, is veiled with a lid, which can be raised and dropped at pleasure; and it opposes also to the whiteness of the light, a tunic entirely black, called the *uvea*, which clothes the extremity of the optic nerve.

The other parts of the body present, in like manner, oppositions to the action of the elements to which they are adapted. Thus the feet of animals, which have to clamber among rocks, are provided underneath with cushions, as is observable under the feet of tygers and lions; and those which inhabit cold countries, are clothed with warm furs, and so on. But, with all this, we must not expect these contraries to be always of the same species in every animal. Nature possesses an infinite variety of means, for producing the same effects, in conformity to the necessities of every individual.

as the thornback, it is armed with prickles, or else, if it happen by any accident to be torn off, it grows again, as in the case of the lizard. Finally, whatever may be the simplicity of its use, one thing is remarkable respecting it, which is, that it is formed, like the other parts of the body, of two similar halves.

There are other interior consonances, which assemble, so to speak, the different organs of the body diagonally, in order to form but one single animal of its two halves. I leave to anatomists the investigation of this incomprehensible connection: but, however profound their knowledge may be, I much doubt their ever being able to trace the windings of this labyrinth. Why, for instance, should the pain which attacks a foot, sometimes make itself felt in the opposite part of the head, and vice versa? I have seen a very astonishing proof of this consonance in the case of a serjeant, who, I believe, is still living, in the Hospital of Invalids. Being one day engaged in a fencing bout with one of his comrades, who, as well as himself, made use of his undrawn sword, he received a thrust in the lachrymal angle of the left eye, which immediately deprived him of his senses. On coming to himself, which did not happen till several hours afterwards, he was found, in his right leg and right arm, to be completely paralytic, and no medical assistance has ever been able to restore to him the use of those limbs.*

* This soldier was of Franche Comté. I saw him but once, and have forgotten both his name and that of the regiment to which he belonged; but I have not forgotten an instance of admirable conduct in him, of which I received the account from undoubted authority. When obliged, by the accident above related, to take up his residence in the Invalids, he remembered that, in his capacity of serjeant, he had inveigled, at the instigation of his captain, in a country village, a young lad to enlist, who was the only son of a poor widow, and who was killed three months afterwards in an engagement. The serjeant recollecting this act of cruelty and injustice, formed the resolution of abstaining from wine. He sold his allowance as a pensioner in the Hospital of the Invalids, and saving the money arising from the sale, remitted it regularly every six months, to the mother whom he had robbed of her son.

I shall observe here, that the cruel experiments which are every day made on brute animals, with the view of discovering these secret correspondencies of nature, serve only to spread over them a thicker veil ; for the muscles, contracted by terror and pain, derange the course of the animal spirits, accelerate the velocity of the blood, put the nerves into a state of convulsion, and tend rather to unhinge the animal economy, than to develope it. These barbarous means, employed by our modern physics, have an influence still more fatal on the morals of those who practise them ; for, together with false information, they generate in the mind the most atrocious of all vices, which is cruelty. If man may be allowed to interrogate nature, respecting the operations which she is pleased to conceal from us, I should suppose the road of pleasure to be the preferable road. At a country seat in Normandy I once saw an instance of it. Walking in the adjoining fields, with a young gentleman who was the proprietor, we perceived some oxen fighting. My companion, with his stick brandished, ran towards them, and the poor animals instantly desisted from the contest. Presently he went up to the most ferocious of the herd, and began, with his fingers, to tickle him at the root of the tail. The animal, whose eyes were the moment before inflamed with rage, became instantly calm, his neck stretched out, his nostrils distended, and inspiring the air with a satisfaction which demonstrated, in the most amusing manner, the intimate correspondence between the two extremities of his body, the tail and the head.

The duplicity of organs is farther observable even in vegetables, especially in their essential parts, as, for instance, in the antheræ of the flowers, which are double bodies ; in their petals, one half of which corresponds exactly to the other ; in the lobes of their seed, &c. A single one of these parts, however, appears to me sufficient, for the growth and generation of the plant : an observation that

might be extended to the very leaves, of which, the two halves in most vegetables are correspondent ; and if any of them deviate from this order, it is, undoubtedly, for reasons well worthy of investigation.

These facts confirm the distinction we have made between the parts and the members of a body ; for, in the leaves where this duplicity occurs, the complete vegetative faculty is usually to be found, which is diffused over the body of the vegetable itself. So that if you carefully plant those leaves, at the proper season, you will see the vegetable reproduced from them. It is, perhaps, from the interior organs of the tree being double, that the principle of vegetative life is diffused even over its slips, as we see it in a great number which sprout again from a single branch. Nay, there are some which have the power of perpetuating themselves by cuttings simply. Of this, a celebrated instance is recorded in the *Memoirs of the Academy of Sciences*. Two sisters, on the death of their mother, became joint heiresses of an orange tree, which each insisted should be thrown into her allotment. At length, after much wrangling, and neither being disposed to resign her claim, it was settled that the tree should be cut in two, and divided between them. Accordingly, it underwent the judgment pronounced by Solomon on the double-claimed child. Being cleft asunder, each of the sisters replanted the half belonging to her ; and, wonderful to relate, the tree, which had been separated by sisterly animosity, actually received from the hand of nature a new clothing of bark.

It is this universal consonance of forms which has suggested to man the idea of symmetry. He has introduced it into most of his works of art, and particularly into architecture, as an essential part of order. In reality, it is so much the work of intelligence and combination, that I consider it as the principal character by which we are enabled to distinguish all organized bodies from those which

are not organized, but the mere results of a fortuitous aggregation, however regular their assemblage may appear; such as those which produce crystallizations, efflorescences, chemical vegetations, and igneous effusions.

It was in conformity to these reflections, that, on considering the globe of the earth, I observed, with the greatest surprize, that this too, like every organized body, presented a duplicity of form. I had conceived, indeed, from the first, that, being the production of an intelligent power, order must of necessity pervade it. I had observed, and admired, the utility of islands, and even that of banks, of shelves, and of rocks, to protect the parts of the continents which are most exposed to the currents of the ocean, at the extremities of which they are always situated. I had, in like manner, discerned the utility of bays, which, on the contrary, are removed from the currents of the ocean, and hollowed into deep retreats, to shelter the discharge of rivers, and to serve, by the tranquillity of their waters, as an asylum to the fishes, which in all seas resort thither in shoals, to collect the spoils of vegetation, and the alluvions of the land, which are poured into them by the rivers. I had admired, in detail, the proportions of their different fabrics, but, of their combination, my mind had formed no conception. I was bewildered amidst such a multiplicity of cuttings and carvings, of land and sea, and should, without hesitation, have ascribed the whole to chance, had not the order, which I perceived in each of the parts, suggested to me the possibility of a similar one prevailing in the combination and totality of the work.

I am now about to display the globe under a new aspect. The reader, I hope, will pardon this digression, which is a fragment, indeed, of the materials I had collected for a geographical composition, but which tends to prove the universality of the natural laws, of which I am endeavouring to

establish the existence. I shall be, as usual, rapid and superficial: and shall thereby enfeeble my ideas, which I have not been permitted to arrange in their natural order; but this is a point of little importance, if I can but succeed in transmitting the germ of them into some head superior to my own.

I searched, at first, for the consonances of the globe in its two halves, the northern and southern. But so far from discovering resemblances between them, I perceived nothing but oppositions; the northern being, if I may so express myself, a terrestrial hemisphere only, and the southern a maritime one, and so different from each other, that the winter of the one is the summer of the other; and the seas of the first again seemed to be opposed to the lands and islands scattered over the second. This contrast, however, presented to me a new analogy with an organized body: for, as we shall see in the following articles, every organized body has two halves in contrast, in like manner as it has two in consonance.

Accordingly, under this new aspect, I found the earth to bear something like an analogy with an animal, of which the head should have been to the north, from the attraction of the magnet, peculiar to our pole, which appears to have fixed there a sensorium, as in the head of an animal; the heart under the line, from the constant heat which prevails in the torrid zone, and which seems to determine this as the region of the heart; and lastly, the excretory organs in the southern part, where the greatest seas, those vast receptacles of the alluvions of continents, are situated; and where we likewise find the greatest number of volcanos, which may be considered as the excretory organs of the seas, the bitumens and sulphurs of which they are incessantly consuming. The sun, again, which sojourns five or six days longer in the northern than in the southern hemisphere, seemed to present to me a farther, and a more marked,

resemblance to the body of an animal, in which the heart, the centre of heat, is somewhat nearer to the head than to the lower extremities.

Though these contrasts appeared to me sufficiently determinate to manifest an order on the globe, and though I perceived something similar in vegetables, distinguished as they are into two parts, opposite in functions and in forms, such as the leaves and the roots; I was afraid of giving scope to my imagination, and of attempting to generalize, through the weakness of the human mind, the laws of nature peculiar to each existence, by extending them to kingdoms, which, perhaps, were not susceptible of the application. But when, with two halves in contrast, I discovered two others in consonance, I no longer doubted of the general order of the globe; though, when I observed, in the duplicity of its forms, members exactly repeated on that side and on this, my astonishment, I confess, was extreme.

The globe, if we consider it from east to west, is divided, as all organized bodies are, into two similar halves, which are the old world and the new. In the eastern and western hemispheres, each of their parts mutually corresponds, sea to sea, island to island, cape to cape, peninsula to peninsula. The lakes of Finland and the Gulph of Archangel, answer to the lakes of Canada and Baffin's Bay; Nova Zembla to Greenland; the Baltic Sea to Hudson's Bay; the islands of Great Britain and Ireland, which cover the first of these mediterraneans, to the islands of Good Fortune and Welcome, which protect the second; the Mediterranean, properly so called, to the Gulf of Mexico, which is a kind of mediterranean formed in part by islands. At the extremity of the Mediterranean, again, we find the Isthmus of Suez in consonance with the Isthmus of Panama, placed at the bottom of the Gulf of Mexico. Conjoined by those isthmuses, the peninsula of Africa presents itself into the old world, and the peninsula of South America in the new. The principal

rivers of these divisions of the globe in like manner confront each other; for the current of the Senegal flows directly opposite to the river of the Amazons. And, lastly, these two peninsulas themselves, mutually advancing towards the south pole, are terminated each by a cape equally noted for the violence of its tempests, the Cape of Good Hope, and Cape Horn. There are, beside, between these two hemispheres, a variety of other points of consonance, on which I shall not insist.

These different particulars, it is true, do not correspond in exactly the same latitudes; but they are disposed in the direction of a spiral line, winding from east to west, and extending from north to south, so that these corresponding points proceed in a regular progression. They are nearly too of the same height, at their setting out from the north, as the Baltic and Hudson's Bay; and they lengthen in America, in proportion as that continent advances towards the south. This progression makes itself farther perceptible along the whole length of the old continent, as may be seen from the form of its capes, which, taking the point of departure from the east, lengthen so much the more towards the south, as they advance towards the west; as the Cape of Kamschatka, in Asia; Cape Cormorin, in Arabia; the Cape of Good Hope, in Africa; and, finally, Cape Horn, in America.

These differences of proportion are to be accounted for from the circumstance of the two terrestrial hemispheres not being projected in the same manner; for the old continent has its greatest breadth from east to west, and the new from north to south; and it is manifest, that this difference of projection has been ordained by the author of nature, for the same reasons which induced him to bestow double parts on animals and on vegetables, that the one, if necessity required, might supply what was deficient in the other, but principally that they might prove to each other of mutual assistance.

If, for example, there existed only the ancient continent, with the South Sea alone, the motion of that sea being too much accelerated under the line, by the regular winds from the east, would, after having surrounded the torrid zone, advance with incredible fury, and pour itself against the lands of Japan with the most tremendous violence: for the size of the billows of a sea, is always in proportion to its extent. But from the position of the two continents, the billows of the great eastern current of the Indian Ocean are retarded, in part, by the archipelagos of the Moluccas and Philippine Islands; and are also broken by other islands, such as the Maldivia, and by the capes of Arabia, and that of Good Hope, in particular, which throws them back towards the south. Before they arrive at Cape Horn, they have to encounter new obstacles, from the current of the south pole, which then crosses their course, and the change of the monsoon, which, at the end of six months, totally destroys the cause of the commotion. Thus, there is not a single current, whether easterly or northerly, which pervades so much as a quarter of the globe, in the same direction. Beside, the division of the parts of the globe into two is so necessary to its general harmony, that, if the channel of the Atlantic Ocean, which separates them, had no existence, or were in part filled up, by the great Atlantis island,* agreeably to an opinion once entertained, all the oriental rivers of America, and all the western ones of Europe would be dried up: for those rivers owe their supplies solely to the clouds which emanate from the sea. The sun too, enlightening, on our side, only one terrestrial hemisphere, the mediterraneans of which would have disappeared, must burn it up with his rays; and at the same time as he warmed, on the other side, a hemisphere of water only, of which most of the islands would of course be sunk, from

* A fabulous island imagined by Plato, as many learned men have demonstrated, to represent allegorically the Athenian government.

the quantity of this water being increased by the subtraction of the water from our hemisphere, an immensity of vapour would arise to no purpose.

It would seem as if it were from these considerations, that nature has not placed in the torrid zone the greatest length of continents, but only the mean breadth of America and of Africa, because the action of the sun would there have been too vehement. She has placed there, on the contrary, the longest diameter of the South Sea, and the greatest breadth of the Atlantic Ocean, and has beside multiplied islands more there than any where else ; and placed in the breadth of such continents as she has lengthened out, in that quarter, the greatest bodies of running water, all issuing from mountains of ice, such as the Senegal and the Nile, which flow from the Mountains of the Moon in Africa, and the Amazon and the Oroonoko, which have their sources in the Cordeliers of America.

It is for this reason also that she has multiplied, in the torrid zone, and its vicinity, lofty chains of mountains covered with snow, and that she directs thither the winds both of the north pole and of the south, of which the trade winds always partake. And it is very remarkable, that several of the great rivers which flow there, are not situated precisely under the line, but in such regions of the torrid zone as are hotter even than the line itself. Thus, the Senegal rolls its stream in the vicinity of Zaara, or the Desert, which, if we may credit the concurring testimony of all travellers, is the hottest part of Africa.

From all this taken together, we have a glimpse of the necessity of two continents, to serve mutually as a check to the movements of the ocean. It is impossible to conceive how nature could have disposed them otherwise, than by extending one of them lengthways, and the other in breadth, in order that the contrasted currents of their ocean might balance each other, and that there might thence

result a harmony, adapted to their shores and to the islands contained in their basins. Were we to suppose these two continents projected circularly, from east to west, under the two temperate zones, the circulation of the sea contained between them, as we have seen, would be too violently accelerated by the constant action of the east wind. There would be no longer, from the line towards the poles, any marine communication; consequently, no icy effusions in that sea, no tides, no cooling, and no renovation of its waters.—If we suppose, on the contrary, both continents extended from north to south, as America is, there would be no longer in the ocean any oriental current; the two halves of each sea would meet in the midst of their channel, and their polar effusions would encounter each other with an impetuosity, of which the icy effusions precipitated from the Alps, with all the dreadful ravages which they commit, will convey but a faint idea: whereas, by the alternate and opposite currents of the seas, the icy effusions of our pole proceed, in summer, to cool Africa, Brazil, and the southern parts of Asia, forcing its way beyond the Cape of Good Hope, by the monsoon which then carries the current of the ocean towards the east; and during our winter, the effusions of the south pole proceed towards the west, to moderate, on the same shores, the action of the sun, which is there unremitting. By means of these two spiral motions of the seas, similar to those of the sun in the heavens, there is not a single drop of water but what may make the whole circuit of the globe, by evaporation under the line, dissolution into rain in the continent, and congelation under the pole. These universal correspondencies are so much the more worthy of being remarked, as they enter into all the plans of nature, and every where present themselves in the rest of her works.

From any other imaginable order, would result other inconveniencies, which I leave to the penetration of the

reader to discover. Hypotheses *ab absurdo*, are at once amusing and useful; they change, it is true, natural proportions into caricatures; but they have this advantage, that, by convincing us of the weakness of our own understanding, they impress us with a deep sense of the wisdom of nature. Let us recollect the Socratic method of ratiocination: not to waste our time in overturning systems which present to us plans different from those we see; but merely to deduce from them their natural consequences; for, to admit such systems, is all that is necessary to refute them.

I could farther demonstrate, that the majority of islands consist themselves of double parts, like continents, of which, as I have elsewhere said, they are abridgements, from their peaks, their mountains, their lakes, and their rivers, proportioned to their extent. Many of those which are situated in the Indian Ocean, have, if I may so express myself, two hemispheres, the one eastern, and the other western, divided by mountains which run from north to south; so that when it is winter on one side, summer reigns on the other, and the reverse: such are the islands of Java, Sumatra, Borneo, and most of the Philippines and Moluccas, which are evidently constructed for the two monsoons of the ocean in which they are placed. If time would permit, the varieties of their construction would furnish me with many curious remarks, tending to confirm, in particular, what I have said, generally, respecting the consonances of the globe. For my own part, I believe these principles of order to be so certain, that, on seeing the plan of an island, with the elevation and direction of its mountains, it would be possible, I have no doubt, to ascertain its longitude, its latitude, and what are the winds which most regularly blow there. And I farther believe, that, these last being given, we might, on the other hand, find out the plan and shape of an island, situated in whatever

part of the ocean. From this, however, I except fluviatic islands, and such others also which, being too small of themselves, are collected into archipelagos, as the Maldivias, because islands of this nature have not the centre of all their conformities in themselves, but are adapted to the adjoining rivers, archipelagos, and continents.—That I am advancing here no paradox, the reader may assure himself, by comparing, between the tropics, the general form of the islands which are exposed to the two monsoons, and that of the islands which are under the regular east wind. We have just observed, that nature had given, in a certain sense, two hemispheres to the first, in dividing them through the middle by a chain of mountains running north and south, in order that they might receive the alternate influences of the east and west winds, which blow there, by turns, six months of the year ; but in the islands situated in the South Sea and the Atlantic Ocean, where the east wind blows incessantly from the same quarter, she has placed the mountains at the extremity of the land, in the part most remote from the wind, that the brooks and rivers formed from the clouds, which are accumulated by that wind on their peaks, may flow through the whole extent of these islands.

I am sensible that I have elsewhere related these last observations, but I present them here in a new light. Beside, in repeating new truths, tautology is, perhaps, pardonable, and some indulgence due also to the weakness of him who announces them.

END OF THE FIRST VOLUME.

